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GENÈVE
FOUNDED BY DR. MAX THOREK

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Abdominal Surgery

Intestinal Obstructions Following Gynecological Operations

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INTESTINAL obstruction continues to be one of the more common and potentially fatal complications following transperitoneal gynecologic surgery. In a previous publication[1a] I analyzed intestinal obstruction as a complication in a personal series of 487 consecutive transperitoneal gynecologic operations. This paper is a consideration of intestinal obstruction in a personal series of 563 transperitoneal gynecologic operations. As has been emphasized elsewhere,[1b] periodic study of postoperative complications is essential to continuing improvement in surgical skill.

The 563 operations are summarized in Table 1. They represent the common transperitoneal procedures in gynecologic and obstetric practice. Hysterectomy (247 cases) was the operation most frequently performed and the one most commonly followed by intestinal obstruction. There were 316 other celiotomies, including cesarean section, adnexal procedures, conservative operations for endometriosis and intestinal resections (incidental to pri-

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The author analyzes 8 cases of intestinal obstruction occurring within the first two months after transperitoneal gynecologic operations in a series of 563 personal cases. In 7 of the 8 cases the obstructions followed abdominal hysterectomy. Not only were three of the operations performed in urgent or emergency circumstances, but actual or potential infection was present when hysterectomy was performed. There were no deaths.

It is pointed out that this type of complication is not uncommon in gynecologic practice.

mary gynecologic operations), in which hysterectomy was not performed.

Incidence of Postoperative Obstruction.—The occurrence of postoperative obstruction in the 563 cases is summarized in Table 2. In 7 instances (2.8 per cent) it occurred in the group of 247 hysterectomies, while in only 1 patient (0.3 per cent) did obstruction develop in the group of 316 laparotomies. Although adynamic ileus occurred more commonly following hysterectomy than after laparotomy without hysterectomy, it was not a significant complication in this series of 563 patients, except for occasional difficulty in the differentiating it from mechanical ileus.

There was no instance of obstruction of the small bowel secondary to peritonitis from ureteroperitoneal fistula subsequent to injury to the pelvic ureter at the time of a pelvic operation. The series contains no instance of postoperative obstruction of the colon, although I am acquainted with several instances of obstruction of the large bowel due to carcinoma, diverticulitis granuloma or endometriosis, first recognized several days after a primary gynecologic operation. (At this point it should be mentioned that a not uncommon occasion for obstruction of the small bowel is the use of a general anesthetic for a nonabdominal surgical operation, such as radical mastectomy or thoracotomy, months or years after a long-forgotten pelvic laparotomy. Apparently, postanesthetic ileus and other changes in intestinal motility incident to general anesthesia can initiate volvulus or other types of mechanical obstruction secondary to intraperitoneal adhesions from a remote pelvic operation.)

The Primary Operations.—Table 3 summarizes the disorders for which the eight operations followed by mechanical obstruction were performed. Three hysterectomies for uterine myoma and one hysterectomy for pelvic inflammatory disease were done electively under ideal circumstances. The other four operations were performed under urgent or emergency conditions:

1. Rapid completion of a Wertheim operation, including through-and-through closure of the abdominal wall, because of furious hemorrhage from the hypogastric venous plexus.
2. Emergency hysterectomy for uncontrollable cervical hemorrhage six days after a cold knife conization.

TABLE 1.—*Transperitoneal Operative Procedures*

Operations	*Number of Cases*		
A. Hysterectomy			247
Total abdominal		183	
With cesarean section	6		
With Wertheim extension	6		
Subtotal abdominal		20	
With cesarean section	9		
Vaginal		44	
B. Laparotomy			316
All types, including cesarean section, adnexal operations, intestinal resection, etc.			
Total			563

TABLE 2.—*Incidence of Postoperative Obstruction of the Small Bowel in 563 Cases*

Operation	*Number of Cases*	*Mechanical Obstruction Number of Cases*
Hysterectomy	247	7
Laparotomy	316	1
Total	563	8

3. Postpartum hysterectomy for placenta accreta.
4. Laparotomy for ruptured tubal pregnancy.

Details of the primary operations that were followed by obstruction of the small bowel are summarized in Table 4.

Onset and Diagnosis of Obstruction.—Although 6 obstructions occurred before the tenth postoperative day (3 on the fifth day, 2 on the sixth, and 1 on the ninth), 2 occurred as late as the forty-sixth and the fifty-second respectively. In 1 patient two episodes of obstruction occurred, both of which required surgical intervention, the first on the fifth postoperative day and the second on the twenty-third. As is well known, obstruction following an abdominal operation may occur as long as the patient lives, and may be occasioned years after the primary procedure by the use of a general anesthetic for an unrelated nonabdominal operation, as has been mentioned. Recurrent episodes of mechanical obstruction are all too common, and "obstruction cripples" are known to most experienced surgeons. Table 5 indicates the postoperative days on which a secondary operation for relief of obstruction was performed in the series under discussion.

The cardinal symptoms of mechanical obstruction are recurrent attacks of colicky abdominal pain, vomiting, abdominal distention and obstipation. The last-mentioned symptom, however, cannot be considered a sign of significance in early obstruction, because the segment below the site of obstruction tends to function normally and empty itself in the early hours. If the physician will sit at the bedside for half an hour (or longer if necessary) and observe the patient with the abdomen exposed in a good light, the typical high-pitched "tinkles" may be heard at the height of a violent peristaltic rush, when the patient may twist with pain and may even vomit despite a functioning gastric tube. If the abdomen is inspected in a good light, visible peristalsis may accompany the recurrent colic. In the interval between peristaltic rushes the patient is more or less comfortable; the abdomen is silent, and no peristaltic activity is visible.

In contrast to the patient with mechanical obstruction, the woman with adynamic ileus, although vomiting and distended, is usually euphoric and on examination presents a quiet or silent abdomen. Digital

TABLE 3.—*Conditions for Which Primary Operation Was Performed*

Pathologic Condition	*Mechanical Obstruction*
Myomas of uterus	3
Pelvic inflammatory disease	1
Carcinoma of cervix	1
Secondary hemorrhage of cervix following cold knife conization	1
Placenta accreta	1
Oviductal pregnancy	1
Total	8

TABLE 4.—*Extent of Original Operation*

Operation	*Mechanical Obstruction*
Total abdominal hysterectomy	1
Total abdominal hysterectomy and appendectomy	1
Total abdominal hysterectomy and lysis of adhesions	1
Total abdominal hysterectomy and unilateral salpingo-oophorectomy	1
Total abdominal hysterectomy and bilateral salpingo-oophorectomy	1
Total abdominal hysterectomy, bilateral salpingo-oophorectomy and appendectomy	1
Wertheim procedure	1
Salpingectomy and myomectomy	1
Total	8

examination of the rectum reveals the sphincter to be typically patulous in cases of adynamic ileus, whereas in cases of mechanical obstruction it is more likely to be contracted. It should be emphasized at this point, however, that in the decompensated phase of mechanical obstruction the abdomen is usually silent, the patient free of pain and visible peristalsis conspicuous by its absence. It is in the decompensated stage of mechanical obstruction that the clinical features not only resemble those of adynamic ileus but may easily be confused with them.

Roentgen studies of the abdomen are of ancillary help in differentiating mechanical obstruction from adynamic ileus. To be of maximum assistance, a film of the abdomen should be taken early in the course of the suspected obstruction and repeated at intervals until the diagnosis is clear. The roentgen demonstration of a distended loop or loops of small bowel in the absence of colonic flatus is diagnostic of mechanical obstruction, whereas grossly dilated loops of small bowel with gas in the colon are typically associated with adynamic ileus. As was pointed out by McCune and his associates,[2] if incarceration of the small bowel in the abdominal wall is suspected, a lateral roentgenogram of the abdomen, taken with the patient standing, may confirm the diagnosis. Mellins and Rigler[3] have offered the following roentgen signs as strongly suggestive of strangulating obstruction: (1) the so-called "coffee-bean" shadow, due to gas shadows separated by apposed intestinal walls; (2) the "pseudotumour" shadow (usually lobulated in outline); (3) fixation of a loop of small bowel; and (4) loss of the normal mucous membrane pattern within the closed loop or above it. It has been my experience, however, that the so-called classic roentgen observations in cases of obstruction of the small bowel are demonstrated infrequently, and usually the conclusion is equivocal.

TABLE 5.—*Postoperative Days on Which Secondary Operation Was Done for Relief of Obstruction*

Postoperative Day	*Number of Cases*
5th*	3
6th	2
9th	1
23d*	1
48th	1
52d	1

*On 1 patient 2 laparotomies were performed for relief of obstruction due to multiple adhesions (plastic peritonitis), the first on the fifth and the second on the twenty-third postoperative day.

ETIOLOGIC FACTORS AND REPORT OF CASES

The anatomic causes of the 8 mechanical obstructions are indicated in Table 6.

Multiple Adhesions of the Small Bowel: —This was the cause of obstruction in 4 patients (Cases 1, 2, 3, and 4).

CASE 1.—Emergency abdominal hysterectomy for uncontrollable cervical hemorrhage was performed on a 36-year-old woman, para 3, six days after a cold-knife conization. Conservative therapy, including tube decompression, was carried out for two days prior to the fifth postoperative day, when a secondary operation was undertaken for relief of mechanical obstruction. Agglutination of two loops of small bowel due to extensive plastic peritonitis was observed. The adhesions were separated without resection of the bowel and the patient's course was uneventful. She was dismissed six days later, only to be readmitted twenty-three days after hysterectomy with a second episode of complete mechanical obstruction. Plastic peritonitis, with multiple points of intestinal obstruction due to fibrous adhesions, was observed at operation. Release of obstruction (without intestinal resection) and incidental appendectomy (for subacute periappendicitis) were followed by prompt recovery. The obvious portal of bacterial entry that led to the plastic peritonitis was the infected, bleeding cervix, which was delivered into the peritoneal cavity at the time of hysterectomy.

CASE 2.—A 51-year-old virgin with anemia secondary to chronic loss of blood underwent elective total abdominal hysterectomy with bilateral salpingo-oophorectomy for myomas. Operation was without incident, but signs of peritonitis developed five days later. Gastro-

intestinal decompression and antibiotics were started. After four more days (ninth postoperative day) signs of mechanical obstruction of the small bowel were evident, and a secondary operation was performed. Exploration revealed diffuse plastic peritonitis; an intraperitoneal abscess containing 1,000 cc. of pus (*Escherichia coli*); gangrene and thrombosis of the omentum, and obstruction due to agglutination of several loops of jejunum and midileum. Recovery was uneventful after the secondary operation. It is probable that the portal of entry was the vagina, which was opened at the time of panhysterectomy.

CASE 3.—A woman 32 years old, para 2, underwent elective total abdominal hysterectomy and lysis of omental adhesions to the pelvis because of pelvic inflammatory disease. (Ten years earlier a right salpingo-oophorectomy and appendectomy had been performed, to be followed a year later by laparotomy for recurrent partial obstruction of the small bowel.) The posthysterectomy course was complicated by recurrent partial obstruction of the small bowel, beginning on the fifteenth day. The first two episodes responded to conservative measures, including intubation. On the patient's third admission for postoperative obstruction, however (fifty-second postoperative day), signs of complete obstruction were demonstrated.

Exploration showed extensive granulomatous peritonitis and obstruction due to a gangrenous closed loop of ileum, for which resection and end-to-end anastomosis were performed. Examination of the granulomas on the surface of the resected ileum under polarized light demonstrated crystals indistinguishable from starch granules. Bio-sorb glove powder had been used at hysterectomy.

Comment: As has been pointed out by McAdams,[4] the starch in Bio-sorb is a foreign body until absorption takes place, and the longer absorption is delayed the greater is the likelihood of foreign-body reaction and the formation of permanent adhesions. Although the patient in this case may be regarded as an "adhesion-former," since both primary operations were followed by obstruction of the small bowel requiring reoperation, the current episode was clearly due to granulomatous peritonitis caused by starch granules. The point should be emphasized that, until absorption takes place, Bio-sorb granules are as much a foreign body as is talc. The studies of Wiland and his associates,[5] in which a comparison of talc and absorbable starch powders is made, clearly demonstrate the reaction of peritoneal surfaces to the implantation of modified starches.

TABLE 6.—*Anatomic Cause of Mechanical Obstruction*

Diagnosis		*Number of Cases*
Multiple adhesions of small intestine		4
With plastic peritonitis	2	
With granulomatous peritonitis	1	
Without peritonitis	1	
Volvulus of small intestine on its mesentery		2
Adhesive band to operative site		1
Peritoneal hiatus (partial wound dehiscence)		1
Total		8

Comment: This case also points out the importance of not overextending the indications for conservatism, including the use of tube decompression, unless recovery is prompt and unequivocal. As reported by Becker,[6] the incidence of strangulation in his group of early obstructions due to subacute inflammatory peritonitis (adhesive ileus) was 10.5 per cent.

CASE 4.—A 32-year-old sterile patient underwent an emergency laparotomy for ruptured tubal pregnancy. Salpingectomy (with incidental myomectomy for a pedunculated subserous uterine myoma) was performed without incident, and convalescence was uneventful until signs and symptoms of mechanical obstruction of the small bowel developed forty-seven days later. Because of failure to achieve relief with suction and supportive treatment, a secondary operation was performed twelve hours later (forty-eight days after the primary operation). Exploration showed a clean peritoneal cavity, with complete obstruction due to the adherence of several loops of ileum to ileum and one loop of terminal ileum agglutinated to the salpingectomy site. Recovery was prompt after lysis of the adhesions without intestinal resection.

Comment: The presence of free blood in the peritoneal cavity might explain the development of fibrous adhesions of ileum to ileum, whereas the fixation of the terminal portion of the ileum was due to the raw area at the salpingectomy site. Even in emergency circumstances, the importance of scrupulous peritonealization of all denuded surfaces cannot be emphasized too frequently.

Volvulus of the Small Intestine: There were 2 instances of volvulus of the small intestine (Cases 5 and 6).

CASE 5.—A 47-year-old spinster underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy and incidental appendectomy under general anesthesia because of uterine myomas and extensive pelvic endometriosis. Nausea, vomiting and distention (which were interpreted as due to ileus) began on the first postoperative day and continued unabated, despite nasogastric suction and supportive measures. The diagnosis of mechanical obstruction of the small bowel was made on clinical evaluation on the fifth postoperative day. The radiologist's report read "gaseous distention of the small bowel which could point to an obstruction, but air is also distributed widely through the colon." Reoperation on the fifth postoperative day showed the cause of the obstruction to be a volvulus (180 degrees) of the small bowel on its mesentery. No adhesions were encountered, but there was approximately 250 cc. of turbid free peritoneal fluid, culture of which yielded a pure growth of *Staphylococcus aureus*. Despite Erythromycin therapy (to which the organism was sensitive) and adequate supportive measures, nasogastric suction was required for seven days after the secondary operation because of persistent ileus, presumably secondary to staphylococcic peritonitis resulting from the profusion of staphylococci throughout the impaired (although viable) bowel wall. As is typical with peritonitis, the abdominal tenderness involved the flanks as well as the anterior abdominal wall. Recovery promptly occurred after the evacuation of a wound abscess (due to *Staph.* aureus), ten days after the secondary operation for relief of obstruction.

CASE 6.—A 51-year-old woman, para 15, underwent an elective panhysterectomy, with incidental appendectomy, for uterine myomas. Signs of early partial obstruction began four days later. Intubation was started and the patient observed at frequent intervals. The intestinal tube could not be advanced beyond the stomach. Successive roentgen examinations of the abdomen were made, which by the sixth postoperative day were interpreted as showing obstruction, probably in the midileum. Reoperation was undertaken on the sixth postoperative day, and the cause of the obstruction proved to be a volvulus (180 degrees) of the small intestine on its mesentery. The peritoneal cavity was clean, and there were no adhesions. Recovery, except for a minor wound abscess, was uneventful.

Comment: Volvulus of the small intestine can occur as a primary phenomenon, as is illustrated by these cases and by the instances of spontaneous volvulus in pregnant and recently delivered women. Volvulus of the small bowel is an especially lethal type of postoperative obstruction, as it can cause early strangulation. It need hardly be argued that persistence in attempts at decompression in the 2 cases here reported would have eventuated only in gangrene of an overwhelming extent and in certain death.

Adhesive Band to Operative Site: In Case 7, obstruction was due to the adhesion of a fibrous band to the site of operation.

CASE 7.—A 40-year-old woman, para 1, underwent emergency postpartum hysterectomy for placenta accreta in a bicornate uterus. Left salpingo-oophorectomy was done at the time because of a large calcified ovarian fibroma. Adynamic ileus occurred on the third postoperative day, when intubation was instituted. Despite repeated attempts (under fluoroscopic control) the tube could not be introduced beyond the pylorus, and signs of mechanical obstruction were evident three days later (six days after hysterectomy). At reoperation the cause of the obstruction proved to be a fibrous band extending from the terminal portion of the ileum to the exposed ends of a catgut ligature in the right adnexa, adjacent to the site of uterine resection. Early partial volvulus of the small intestine on its mesentery had already started. The adhesive band was divided and the volvulus reduced. The subsequent course was without incident.

Comment: This case points up the importance of frequent and careful postoperative observation of the patient in whom adynamic ileus develops, if signs of mechanical obstruction are to be recognized before the treacherous decompensated phase sets in, at which time the picture is indistinguishable from that of paralytic ileus. In Becker's series of cases of acute adhesive ileus[6] the mortality rate was 38.4 per cent in the 52 cases in which tube decompression was abused.

Partial Wound Dehiscence: In Case 8, partial wound dehiscence was responsible for the obstruction.

CASE 8.—A Wertheim hysterectomy was performed on a 52-year-old woman, para 8, for Stage I carcinoma of the cervix. The operation was complicated by copious hemorrhage from the left hypogastric venous plexus. The procedure was completed rapidly and the abdominal wall closed with through-and-through sutures, because of the patient's critical condition. Signs of partial obstruction of the small bowel began three days later, when intubation and supportive measures were instituted. Evidence of complete obstruction developed early on the morning of the fifth posthysterectomy day (three days after intubation had been started), to be relieved ten hours later when the spontaneous evisceration occurred. At the time of secondary closure, three loops of dilated, dusky cyanotic ileum, which had been incarcerated in the peritoneal hiatuses of the abdominal wound, were observed. Recovery was uneventful after secondary closure.

Surgical Management of Obstruction.—Conservative management of suspected mechanical obstruction is defensible only if it results in release of the obstruction within several hours, and this is signaled by relief of pain, a diminished output from the intestinal tube and progressive passage of significant amounts of flatus from the small into the large bowel as demonstrated by rectal passage or serial roentgenograms. Frequent observation of the patient is mandatory. If doubt exists that the obstruction has been relieved, operation is indicated as soon as the patient has been adequately prepared.

TABLE 7.—*Operative Procedures for Relief of Obstruction*

Procedure	*Number of Cases**
Detorsion of volvulus, small intestine	2
Division of adhesive band to operative site	1
Lysis of adhesions	1
Lysis of adhesions and appendectomy	2
Lysis of adhesions, omentectomy and drainage of intraperitoneal abscess	1
Lysis of adhesions, ileal resection and end-to-end anastomosis	1
Secondary closure abdominal wound	1
Total operations (8 patients)	9

*On 1 patient 2 laparotomies were performed for relief of obstruction due to multiple adhesions (plastic peritonitis): lysis of adhesions on the fifth postoperative day, lysis of adhesions and appendectomy on the twenty-third.

The various operations performed for release of obstruction in the current series are summarized in Table 7. Intestinal resection was required only once; all the other obstructions were relieved by simple measures (lysis of adhesions in 6 instances, and detorsion of a volvulus in 2).

Gastric suction should be continuous until both flatus and feces are passed rectally, despite an otherwise satisfactory clinical status, including the demonstration of active peristaltic sounds. Moreover, ileus may persist for a week or more after relief of mechanical obstruction, if peritonitis persists (cf. Case 6), and/or if there is an occult extraperitoneal abscess, for instance in the abdominal wall.

SUMMARY

The problem of intestinal obstruction occurring in the first two months after transperitoneal gynecologic surgery in a series of 563 personal cases is examined. Seven of the 8 obstructions followed abdominal hysterectomy. Not only were 3 of the operations performed in urgent or emergency circumstances, but actual or potential infection was present at the time of hysterectomy. There was no mortality.

CONCLUSIONS

1. Intestinal obstruction is a common serious complication after transperitoneal gynecologic surgery.

2. Total abdominal hysterectomy is the operation most often followed by obstruction, and the risk is significantly increased when hysterectomy is done in urgent or emergency circumstances, or when there is actual or potential infection.

3. Obstruction may occur at any time while the patient lives, although it occurs most frequently in the first ten postoperative days. Early obstruction is typically of the simple or plastic variety, in which only the lumen is closed, whereas late obstruction is more often of the strangulating type, with impairment of circulation as well.

4. The diagnosis of obstruction should be based on clinical appraisal of the patient, assisted by roentgen studies.

5. Early operation for release of obstruction is mandatory unless the signs of obstruction are promptly relieved by conservative measures, including intubation. If doubt exists as to the relief of obstruction under conservative management, immediate operation is indicated even in the face of known peritonitis.

6. Bacteriologic study of peritoneal fluid obtained at the time of laparotomy for relief of obstruction should be carried out as a routine. Gram stain, a centrifuged specimen, cultures and sensitivity tests are required in the chemotherapeutic management of coincidental peritonitis. (Whenever possible, direct sensitivity tests should be done; this will save twenty-four hours in obtaining the bacteriologic report, thereby permitting earlier prescription of specific antimicrobial therapy.)

7. After relief of obstruction by surgical intervention, gastric suction should be continued, despite active peristalsis, until both flatus and feces are passed from below.

8. Despite the viability of the bowel wall in cases of mechanical obstruction, bacterial perfusion may occur, with resulting generalized peritonitis.

9. After surgical relief of obstruction of the small bowel, persistent reflex ileus may be expected as long as residual peritonitis or an extraperitoneal abscess is present.

10. Scrupulous attention to the prevention of peritoneal contamination (from vagina, cervix, abdominal wall, bowel, operating team, etc.), meticulous peritonealization of raw surfaces and careful layer-by-layer closure of the abdominal wall are urged as prophylactic measures against intestinal obstruction.

11. The surgical team, including nursing supervisors and scrub nurses, must be aware of the hazard of granulomatous peritonitis if modified starch or any other glove powder is introduced into the peritoneal cavity. The surgeon's gloves, whether put on by a wet or a dry technic, should introduce no powder into this area.

12. An incisional scar on a patient's abdomen should warn attendants that the possibility of intestinal obstruction exists as long as the patient lives.

SCHLUSSFOLGERUNGEN

1. Der Darmverschluss is eine häufige ernste Komplikation nach transperitonäalen gynäkologischen chirurgischen Eingriffen.

2. Die abdominale Totalresektion der Gebärmutter ist die Operation, auf die Darmverschlüsse am häufigsten folgen; ihr Risiko wächst erheblich, wenn die Resektion unter dringenden oder Notumständen erfolgt, oder wenn gleichzeitig eine Infektion wirklich oder möglicherweise vorliegt.

3. Der Darmverschluss kommt zwar am häufigsten in den ersten zehn Tagen nach der Operation vor, kann aber jederzeit während des Lebens der Kranken auftre-

ten. Der frühzeitig auftretende Verschluss ist in typischen Fällen einfacher oder plastischer Art, wobei lediglich die Darmlichte verschlossen ist, während der spät auftretende Verschluss häufiger strangulierender Art ist, wobei auch eine Störung der Zirkulation vorliegt.

4. Die Diagnose eines Verschlusses sollte auf klinische Untersuchung der Patientin unter Hinzuziehung von röntgenologischen Studien beruhen.

5. Frühzeitige operative Behandlung ist zur Behebung des Verschlusses unerlässlich, es sei denn, dass die Zeichen des Verschlusses durch konservative Massnahmen einschliesslich der Intubation sofort beseitigt werden können. Wenn Zweifel bestehen, ob der Verschluss durch konservative Behandlung behoben werden kann, ist eine sofortige Operation angezeigt, auch wenn eine Bauchfellentzündung vorliegt.

6. Flüssigkeiten, die beim Eingriff zur Behebung eines Darmverschlusses in der Bauchhöhle gefunden werden, sollten routinemässig bakteriologisch untersucht werden. Gramsche Färbung, Zentrifugierung einer Probe der Bauchfellflüssigkeit, Anlegung von Kulturen und Durchführung von Empfindlichkeitsproben sind bei chemotherapeutischer Behandlung einer mit dem Darmverschluss einhergehenden Bauchfellentzündung erforderlich. (Wo immer möglich sollten direkte Empfindlichkeitsproben vorgenommen werden; man erhält auf diese Weise den bakteriologischen Bericht 24 Stunden früher, was eine raschere Einleitung einer spezifischen das Bakterienwachstum hemmenden Behandlung gestattet).

7. Nach chirurgischer Behebung des Darmverschlusses sollte die Absaugung des Mageninhaltes, auch wenn aktive Peristaltik vorliegt, fortgesetzt werden, bis Gase und Stuhl durch den Mastdarm abgehen.

8. Bei mechanischem Darmverschluss kann Durchwanderung von Bakterien auch durch die lebensfähige Darmwand hindurch erfolgen und zu einer allgemeinen Bauchfellentzündung führen.

9. Nach chirurgischer Behebung eines Dünndarmverschlusses kann man einen bestehenbleibenden Reflexkrampf des Darmes erwarten, solange noch Reste der Bauchfellentzündung oder ein extraperitonäaler Abszess vorlegen.

10. Um das Auftreten eines Darmverschlusses möglichst zu verhüten, wird dringend geraten, äusserste Vorsicht hinsichtlich Vermeidung von Verunreinigung des Bauchfells (von der Scheide, dem Gebärmutterhals, der Bauchwand, dem Darm, den Chirurgen usw.) walten zu lassen, die rohen Oberflächen peinlichst zu peritonäalisieren und die Bauchwand sorgfältig Schicht für Schicht zu schliessen.

11. Die chirurgische Arbeitsgruppe einschliesslich der Oberschwestern und Operationsschwestern muss mit der Tatsache vertraut sein, dass modifizierte Stärke oder andere Handschuhpuder, die in die Bauchhöhle gelangen, eine granulomatöse Bauchfellentzündung hervorrufen können. Die Handschuhe des Chirurgen sollten, gleichgültig ob sie mit feuchter oder trockener Technik angezogen werden, keinen Puder in das Operationsgebiet einführen.

12. Das Vorliegen einer Operationsnarbe am Bauch einer Patientin sollte den behandelnden Arzt während des ganzen Lebens der Patientin immer an die Möglichkeit eines Darmverschlusses denken lassen.

CONCLUSIONS

1. L'obstruction intestinale est une complication grave et courante après des interventions gynécologiques transpéritonéales.

2. L'hystérectomie abdominale totale est l'opération la plus fréquemment suivie d'obstruction, et le risque est notablement augmenté lors d'hystérectomie d'urgence ou d'infection déclarée ou latente.

3. L'obstruction peut se manifester à n'importe quel moment de la vie de la malade, mais le plus souvent pendent les 10 premiers jours suivant l'opération. L'obstruction précoce est souvent du type simple ou plastique où seul le lumen est fermé, alors que l'obstruction tardive est plus souvent du type étranglé avec troubles circulatoires.

4. Le diagnostic de l'obstruction devrait être basé sur les symptômes cliniques et les examens radiologiques.

5. Une opération précoce s'impose pour le soulagement de l'obstruction, à moins que les signes d'obstruction soient rapidement soulagés par un traitement conservateur comprenant l'intubation. En cas de doute quant au succès du traitement conservateur, une intervention chirurgicale immédiate est indiquée, même en présence d'une péritonite déclarée.

6. L'examen bactériologique du liquide péritonéal prélevé au moment de la laparotomie pour remédier à l'obstruction, devrait être pratiqué dans tous les cas en tant qu'examen de routine. Un colorant Gram, une centrifugation, des cultures et des tests de sensibilité sont nécessaires pour le traitement chimiothérapique de la péritonite. (Des tests de sensibilité direte devraient être faits le plus souvent possible; il font gagner 24 heures pour l'obtention du rapport bactériologique, permettant ainsi la prescription plus rapide d'une thérapeutique spécifique antibactérienne.)

7. Après le soulagement de l'obstruction par une intervention chirurgicale, il faudrait poursuivre l'aspiration gastrique malgré un péristaltisme actif, jusqu'au passage des gaz et des selles.

8. Malgré la viabilité de la paroi intestinale dans les cas d'obstruction mécanique, il peut se produire une diapédèse bactérienne suivie d'une péritonite généralisée.

9. Après le soulagement chirurgical de l'obstruction du grêle, l'on peut s'attendre à un iléus réflexe persistant aussi longtemps que subsistera une péritonite résiduelle ou un abcès extrapéritonéal.

10. L'auteur recommande vivement d'accorder une attention scrupuleuse à la prévention d'une contamination péritonéale (par le vagin, le col, la paroi abdominale, l'intestion, l'équipe opératoire, etc.) et de pratiquer une péritonisation très soignée des surfaces crues, ainsi que de suturer avec soin, couche par couche, la paroi abdominale, cela en tant que mesures prophylactiques contre l'obstruction intestinale.

11. L'équipe chirurgicale, ainsi que le personnel infirmier et les aides infirmières, doivent être conscients du risque de péritonite granulomateuse pouvant être provoqué par de l'amidon modifié ou toute autre poudre à gants, introduits dans la cavité péritonéale. Il faut veiller à ce que les gants du chirurgien, enfilés selon une technique humide ou sèche, ne permettent l'introduction d'aucune poudre dans cette région.

12. Une cicatrice d'incision sur l'abdomen d'une malade est un signe d'avertissement de la possibilité d'une obstruction tant que la malade vivra.

CONCLUSIONI

1. L'occlusione intestinale è una complicazione frequente e grave della chirurgia ginecologica transperitoneale.

2. L'isterectomia totale addominale è l'intervento che più spesso è seguito da occlusione, e questo rischio è tanto più frequente quando l'isterectomia viene eseguita d'urgenza o in circostanze di emergenza, o quando vi sia una infezione potenziale o in atto.

3. L'occlusione può manifestarsi in qualunque momento, pur essendo più frequente nei primi dieci giorni dopo l'intervento. L'ostruzione precoce è tipica della

varietà semplice o plastica, in cui soltanto il lume intestinale è chiuso, mentre l'occlusione tardiva è più spesso del tipo da strozzamento in cui si associano disturbi circolatori della parete.

4. La diagnosi di occlusione deve essere basata sui segni clinici e radiologici.

5. L'intervento precoce è indispensabile a meno che i segni dell'occlusione non cedano prontamente alla terapia conservativa, con speciale riguardo all'intubazione intestinale. Se esistono dubbi sulla efficacia di tali misure, l'intervento deve essere immediatamente eseguito, anche in presenza di peritonite.

6. Si debbono compiere abitualmente le ricerche batteriologiche sul liquido peritoneale raccolto durante la laparatomia, comprese le colorazioni specifiche, la centrifugazione, le culture e i test di sensibilità, per poter condurre una corretta chemioterapia della peritonite associata. Ogni qual volta sarà possibile si dovranno eseguire i test di sensibilità diretta, i quali consentono di risparmiare 24 ore e quindi permettono di iniziare la cura antimicrobica specifica più precocemente.

7. Rimossa l'ostruzione con l'atto operatorio, si dovrà continuare la suzione gastrica, anche in presenza di una attiva peristalsi, fino a quando sia ricominciato il passaggio dei gas e delle feci.

8. Nonstante la normalità della parete intestinale durante l'occlusione meccanica può aversi una diffusione batterica, e una consequente peritonite generalizzata.

9. Dopo la rimozione dell'occlusione ci si deve aspettare che un ileo riflesso persista almeno fino a che dura la peritonite residua o sia presente un ascesso extraperitoneale.

10. Importantissime misure profilattiche contro l'occlusione intestinale sono rappresentate dalla scrupolosa attenzione nell'evitare la contaminazione peritoneale (dalla vagina, cervice, parete addominale, intestino, etc.), dalla meticolosa peritoneizzazione delle superfici e dalla accurata chiusura a strati della parete addominale.

11. Tutto il personale operatorio deve essere al corrente dei rischi della peritonite granulomatosa che consegue alla presenza del talco o delle altre polveri da guanti nella cavità peritonale.

12. Una cicatrice chirurgica sull'addome di un pazziente deve sempre far pensare alla possibilità di una occlusione intestinale.

CONCLUSIONES

1. La obstrucción intestinal es una complicación frecuente y grave de la cirugía ginecológica transperitoneal.

2. La histerectomía abdominal total es la operación mas a menudo seguida de obstrucción, aumentando francamente su importancia cuando esta histerectomía se hace en un caso de urgencia, así como también cuando existe una infección actual o potencial.

3. La obstrucción puede presentarse en cualquier momento de la vida del postoperado pero lo mas frecuente es que esto ocurra dentro de los primeros diez días del postoperatorio. La obstrucción precoz es tipicamente de la forma plástica simple en la cual solo está cerrada la luz intestinal, mientras que la obtrucción tardía es mas a menudo de tipo extrangulado afecrándose la circulación local.

4. El diagnóstico de la oclusión debe hacerse juzgando sobre los signos clínicos ayudaándose de la radiología.

5. Debe operarse precozmente para suprimir la obstrucción salvo que la terapeutica conservadora, ayudada de la aspiración resuelvan pronto el problema. Si edisten dudas sobre la desaparición de la obstrucción por el método conservador debe procederse al tratamiento quirúrgico aún con evidencia de peritonitis.

6. Sistematicamente debe procederse al estudio bacteriológico del exudado peritoneal obtenido al tiempo de la operación.

Para proceder al tratamiento quimioterápico de la peritonitis coincidente se requieren previamente un Gram, estudio del sedimento, cultivos y pruebas de sensibilidad. (Siempre que sea posible debe procederse a las pruebas directas de sensibilidad; esto ahorra las 24 horas precisaspara un informe bacteriológico y permite instituir precozmente la terapeútica antimicrobiana especifica.)

7. Una vez suprimida quirúrgicamente la obstrucción debe persistirse con la aspiración gástrica a pesar del peristaltismo activo hasta la libre emisión de gases y heces.

8. A pesar de la viavilidad de la pared intestinal puede ocurrir en en casos de obstrucción mecánica perfusión bacteriana que pueda dar lugar a peritonitis generalizada.

9. Una vez suprimido el obstáculo en una obstrucción quirúrgicamente puede persistir un ileo paralítico reflejo determinado por la presencia de una peritonitis residual o un absceso extraperitoneal.

10. Con el fin de prevenirse contra la obstrucción intestinal es preciso llevar la mas escrupulosa atención que impida la contaminación peritoneal (de vagina, cuello, pared abdominal, intestino, personal quirúrgico, etc.) y así mismo es imprescindible la mas cuidadosa peritonización de las superficies denudadas y la minuciosa sutura de las paredes abdominales plano por plano.

11. El personal quirúrgico, incluyendo todas las enfermeras del quirófano, debe estar consciente del peligro de la peritonitis granulomatosa producida por polvo de almidon o de talco introducido descuidadamente en la cavidad peritoneal. Los guantes del cirujano, puestos con un lubricante seco o húmedo no deben llevar polvo alguno al campo operatorio.

12. Toda cicatriz de laparotomía debe ser una razón para el médico para pensar en una obstrucción a lo largo de toda la supervivencia de un operado.

CONCLUSOES

1. A obstrução intestinal é uma seria complicação comum após cirurgia ginecológica transperitoneal.

2. Histerectomia abdominal total é a operação mais frequentemente seguida de obstrução e o risco é significativamente aumentado quando a mesma é feita em circunstancias urgentes ou de emergencia ou quando existe infecção atual ou potencial.

3. Embora a obstrução ocorra mais frequentemente nos primeiros déz dias pós-operatórios, pode ela sobrevir em qualquer tempo enquanto o paciente vive. A obstrução precoce é tipicamente da variedade pastica ou simples, na qual sómente o lumen está fechado, enquanto que a tardia é mais frequentemente do tipo estrangulado com interferencia tambem na circulação.

4. O diagnóstico de obstrução deve ser baseado em observação clinica, auxiliada por estudos radiológicos.

5. É impertativa a operação precoce para a desobstrução a não ser que medidas conservadoras, incluindo intubação ajam prontamente. Se existe duvida quanto a melhora da obstrução por metodos conservadores, impõe-se a operação imediata mesmo em face a peritonite estabelecida.

6. Estudos bacteriologicos do fluido periteoneal obtido durante a laparotomia devem ser feitos rotineiramente. No tratamento quimioterapico da peritonite coincidente deve-se utilisar de colocações Gram, especimens centrifugados, culturas e testes de sensibilidade. (Sempre que possivel, testes de sensibilidade diretos devem ser feitos; isto apressará em 24 horas na obtenção do relatorio bacteriológico, permitindo, portanto antecipar a prescrição de antimicrobianos especificos.)

7. Após a desobstrução cirurgica, deve

se manter sucção gastrica continuada, apesar de peristaltismo ativo, até que gazes e fezes trafeguem livremente.

8. Apesar da viabilidade da parede intestinal em casos de obstrução, podem ocorrer perfusões bacterianas, com consequente peritonite generalisada.

9. Após desobstrução cirurgica do intestino delgado pose se esperar reflexo iliaco persistente enquanto houver peritonite residual ou abcesso extraperitoneal.

10. Devem-se adotar medidas profilaticas contra obstrução intestinal como sejam: atenção escrupulósa na prevenção de contaminação peritoneal (da vagina, cervix, parede abdominal, intestino, equipe cirurgica etc.), peritonealisação meticulósa das superficies e cuidadoso fechamento da parede abdominal por camadas.

11. A equipe cirurgica, incluindo enfermadiras supervisoras e enfermeiras de sala devem estar prevenidas das complicações da peritonite granulomatósa de detritos ou talco nas luvas é introduzido na cavidade peritoneal. As luvas dos cirurgiões, esterilisadas a seco ou vapor, não devem condusir talco para o interior da cavidade.

12. Uma cicatriz incisional no abdomen de um paciente deve sempre lembrar aos que o atendem que enquanto ele viver existe a possibilidade de uma obstrução intestinal.

Examina o problema da obstrução intestinal ocorrendo nos primeiros dois meses após cirurgia ginecológica transperitoneal em uma serie de 563 casos pessoais. Séte das oito obstruções se seguiu a histerótomia abdominal. Não sómente pelo fato de 3 dessas operações terem sido feitas sob regime de urgencia por emergencia como infecção potencial ou atual estava presente na ocasião da histerectomia. Não houve mortalidade.

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"History," said Emerson, "is the biography of Greatness," because "man just waits, but genius acts." Thus true greatness is man's forestalling of immortality. To be great is to live in perpetual defiance of what is close by and in everlasting search of what is eternal and universal in man.

—*Marti-Ibañez*

The Surgical Treatment of Acute Volvulus of the Megasigmoid by Primary Resection

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IN 1947 Bruusgard of Oslo published a comprehensive survey concerning volvulus of the sigmoid colon and its treatment (*Surgery* 22:468-478, 1947). This work, to which reference will be made later, is based on a series of 168 cases observed by the author over a period of ten years. This is the largest series of cases to be published in the international literature, and the author's conclusions are cited in standard textbooks.

The material to be discussed in this paper comprises 59 cases and describes my experience with this dangerous condition over a period of twenty-five years.

Megasigmoid, which is characterized by gross dilatation and hypertrophy of the sigmoid colon is a congenital condition that may appear "on its own" or as a part of generalized hypertrophy, i.e., megacolon.

When megasigmoid appears on its own it is probably a form of localized gigantism, since in such cases megadactyly, megacystis and mega-eosophagus are sometimes present as well. Together with the enormous dilatation of the sigmoid, its mesentery is hypertrophied and has a fibrous appearance, and in it are dilated and hypertrophied blood vessels. Further reference will be made to this fibrosity and to these vessels.

It is known that megasigmoid is common in Eastern Europe, the Balkans and in Scandinavia. This is reflected in the country of origin of my patients, and since a considerable proportion of the population of Israel comes from Eastern Europe, the condition is not unusual here.

As has been mentioned, the most comprehensive survey of this condition comes from Scandinavia, and it seems a little strange that Russian and Polish sources have not provided extensive surveys on a disorder that is not uncommon in those countries.

Much has been written concerning the causes of this condition. The theories that have been put forward are similar to those concerning the causes of megacolon.

Some German pathologists of the nineteenth century put forward the theory that the "slawische Darm" ("Slavonic gut") is the result of the cellulose-rich diet of Eastern Europe. Although there is no scientific foundation for this explanation, it seems quite possible that a cellulose-rich diet increases the coprostasis of patients with megacolon or metasigmoid and thus leads to ileus.

It is obvious that a sigmoid colon ten

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Fifty-nine cases of volvulus associated with megasigmoid, observed and treated by the author, are reported. In 36 of these cases primary resection was done in the acute stage, with such results as lead the author to recommend this treatment when the patient's condition permits. The technical details of the operation are presented.

to twenty times the normal size, with a hypertrophied mesentery, is especially likely to rotate on its axis and cause volvulus. Of 438 cases of volvulus of the large intestine reported in the Scandinavian literature, 284 volvuli were due to megasigmoid. No explanation is available as to what causes the colon to rotate in this fashion, just as none is available for the torsion of other pedicled structures such as the testis, the omentum, the ovarian cyst, etc.

The rotation can be of any degree from incomplete turns that go back of their own accord, with minimal symptoms, to multiple rotations, which are liable to cause the development of dangerous clinical conditions, especially with acute volvulus of the megasigmoid.

As has been stated, the mesosigmoid in cases of megasigmoid is fibrotic and thickened. This abundance of fibrous tissue is the result of cicatrization following previous rotations and is observed in every operation for megasigmoid. Running in the fibrotic mesosigmoid are the hypertrophied blood vessels, and this explains why, even in cases of severe volvulus, the vessels are not completely obliterated even after a few days.

Athough these vessels are hypertrophied, the anastomoses between them are poorly developed and tend to decrease with the development of megasigmoid. Reference will be made to this in the section on operative technic.

Characteristic of this condition is the paradoxic difference in diameter between the proximal and distal loops: It is the distal loop which is the wider. This appears to be analogous to stenosis of the pulmonary artery, with which there is dilatation of the artery after the stenotic area appears. This is explained as a jet phenomenon, and it is possible that the same explanation may be applied to megasigmoid.

In the distal portion of the megasigmoid the anterior taenia is frequently missing. This peculiarity has recently been stressed by Nathan, and I am in a position to corroborate his explanation (Nathan: Problems of Megacolon, Fifth National Congress of Surgeons, Jerusalem, 1959).

Uncomplicated megasigmoid generally does not cause many clinical signs, apart from constipation, which may be very obstinate and last as long as two weeks. The dilated intestine can hold large quantities of feces, which may accumulate over long periods. Many patients, however, show no clinical evidence of their condition; this will be referred to in the statistical survey.

Severe symptoms are observed only in cases of torsion. Many patients undergo partial rotations, which cause a feeling of fullness and pains lasting a few hours. This may appear as subileus, which passes off spontaneously, without intervention. The fibrous scars of the mesosigmoid are, as has been stated, striking proof of these transient incomplete torsions.

The most dangerous complication of megasigmaid is volvulus, i.e., complete rotation on its axis. If the torsion reaches 180 degrees, it results in closing both the proximal and the distal loop. I have encountered rotations of 360 degrees and even 720 degrees, both clockwise and counterclockwise.

At the beginning of the torsion the hyperperistalsis pushes the intestinal contents farther on, thus adding to the dilatation of the megasigmoid.

In cases of megasigmoid with torsion the blood vessels are enclosed in fibrous tissue, and thus complete occlusion of them is prevented. This is in contrast to other forms of volvulus, in which complete occlusion of the blood vessels occurs rapidly and causes gangrene. In my series there was not a single case of gangrene,

even when complete torsion had existed for as long as six or seven days.

Clinically, volvulus of the megasigmoid causes severe colicky pain, with a feeling of abdominal fullness; there is complete constipation, with no passing of flatus. Thus the picture is that of ileus of the large bowel with meteorism that is continually increasing. It is characteristic that the dilated loop of the megasigmoid can be seen through the abdominal wall and palpated in the left upper quadrant.

Generally there is no vomiting; this is because of the vast capacity of the intestine, i.e., the rest of the colon, which is apt, owing to the prolonged coprostasis in the sigmoid, to hold unusually large quantities of feces. In cases of ileus of the large bowel vomiting invariably comes later; but in cases of volvulus of the megasigmoid the absence of vomiting is characteristic. Vomiting appears only in the terminal stage, as a result of paralytic ileus due to peritonitis per diapedesis due to a lesion of the distended wall of the bowel, after the torsion has lasted for a long time. It is to be emphasized that in my series there was not a single case of peritonitis or gangrene. The roentgen picture is typical. A plain film of the abdomen shows the greatly dilated loop of the megasigmoid lying under the left hemidiaphragm. The barium enema shows the typical "bird-beak" sign.

It is thus apparent that the diagnosis is not difficult when the clinical and roentgen pictures are correlated. Obviously, immediate intervention is necessary: there is no unanimity of opinion, however, as to what measures should be taken. Various authors, especially Bruusgard, have emphasized the importance of treatment. This has been successful in a considerable number of cases. The method consists of passing a long rectal tube into the distal loop via the point of constriction and leaving it for a few days. The tube may be passed blindly or through a rectoscope. It is clear that this method is feasible and successful only in cases of mild involvement, when torsion is less than 180 degrees. I have tried it in cases of severe volvulus only when the patient was not fit for operation.

The most enthusiastic supporters of this method admit that its success depends on how long the intestine can hold the tube. The volvulus itself recurs in most cases.

A more efficient method is the introduction of a rectal tube during laparotomy, guided by hand. This method has the same disadvantages as the one aforedescribed. I used it on one occasion only, the patient being an aged woman in poor condition.

The best form of operative treatment is primary resection of the megasigmoid if the patient's general condition permits such a serious operation. I was able to perform this operation in the majority of our cases. (Details are given in the statistical survey.) Of course, this approach is in direct contravention of the generally accepted surgical principle of not resecting the intestine in cases of acute ileus except when there is an absolute indication, such as gangrene or peritonitis. Several authorities warn against primary resection, but it would appear that their caution is a result of lack of experience with this method. In the presence of volvulus of the megasigmoid the physiopathologic picture as related to the dynamics of the intestinal tract differs widely from the usual occlusion of the sigmoid quite apart from the striking difference in the local pathologic changes. Occlusion of the sigmoid (due in the vast majority of cases to carcinoma) is an obstructive process leading to a most critical distention of the whole intestinal tract. The clinical symptoms are those of severe meteorism. which call for immediate relief of the intestine by palliative colostomy or cecostomy. Megasigmoid volvulus, on the other

hand, is the sudden rotation of the enlarged sigmoid near its pedicle, with the functionally inactive, enlarged, coprostatic intestine undergoing a maximal torsion as aforementioned. The resulting severe meteorism is not to be compared to that associated with common occlusion of the sigmoid. Volvulus of the megasigmoid, during the first days of its existence, results scarcely or not at all lead in distention of the small intestine; even after several days the distention is by far less pronounced than with common occlusion of the sigmoid, owing to the aforementioned fact.

This observation was instrumental in directing me to a radical approach in the treatment of megasigmoid volvulus. I resolved not to content myself with palliative measures but to decide on primary resection, subject to the adequacy of the patient's general condition.

Palliative procedures such as cecostomy, colostomy or sigmoidopexy are highly unsuitable. It is true that they relieve the acute ileus, but the diseased condition remains, and the patient is made to suffer the discomforts of a colostomy. These methods involve further operations, i.e., sigmoidectomy and closing of the colostomy. At first I also performed a number of them on patients who were poor surgical risks.

Primary resection has one limitation even for patients in good condition when, in addition to megasigmoid, there is megacolon. In other words, these are the cases in which megasigmoid is part of Hirschsprung's disease. Laparotomy for the acute condition and roentgen study for the subacute or chronic cases enable one to determine the condition of the large intestine. When the dilatation is confined to the sigmoid, the rest of the colon being normal, or when the signs of Hirschsprung's disease are minimal (especially in patients above the age of 40, when it is unlikely that the disease will progress further), my treatment of choice is primary sigmoidectomy. In those cases in which there is a well-developed megacolon, I have lately employed retorsion only in the acute stage, followed later by Svenson's radical operation (abdominoperineal resection of the aganglionic segment).

For children with megasigmoid volvulus of the less severe type, i.e., when the dilatation of the large intestine is not great and the intestinal paresis is not pronounced, I perform sigmoidectomy and suggest proceeding with bilateral lumbar sympathectomy as an experiment.

I wish to mention another radical method of treatment for the acute condition, performed in Israel by Dr. Peyser of Haifa, namely, resection of the megasigmoid in two stages. First an exteriorization procedure is performed according to Miculicz's method, and this is followed later by closure of the colostomy (Dr. O. Alajam, Harefuah 1953). I approve of this method for the radical treatment of this condition, but my own excellent experience with primary resection, even for very old patients, has convinced me that the two-stage operation is generally obsolete and should be reserved only for poor risks.

There are three technical difficulties that must be emphasized:

1. Removal of the grossly dilated sigmoid from the abdomen must be carried out with the greatest circumspection. The loop is liable to burst, so it must be punctured before removal.
2. The mesentery should be separated as sparingly as possible, since, as has been noted, the mesenteric blood vessels are not well developed, and removal of too much mesenteric tissue is liable to cause impairment of the blood supply of the stumps and nutritional disturbance of the wall,

resulting in necroses and fatal leakages. (My few unsuccessful operations were performed during the first period, before I had sufficient experience and so failed to observe this precaution.)

3. Suturing must be done carefully and deeply, so as to secure the serosa and muscularis, since the walls of the intestine are hypertrophied and superficially placed sutures will not bear the strain.

Making the anastomosis presents a special problem, since in most cases there is a considerable difference in diameter between the distal and the proximal loop; paradoxically, the distal loop is the wider. I have observed disparities in diameter of the order of 16 to 6, 12 to 7 and 15 to 5 cm. in these cases such circumstances the anastomosis must be made side-to-side or end-to-side. If the diameters of the two loops are approximately equal an end-to-end anastomosis can be carried out, or one may artificially creating conditions, if possible, by gathering the farther distal most loop in order to perform end-to-end anastomosis.

The mesentery of the megasigmoid is separated close to the intestine and used for covering the anastomosis.

Statistical Survey of Cases of Megasigmoid Volvulus Observed over a Period of Twenty-five years.—Total number of cases 59. Sex of patients: 21 females; 38 males. Ages ranging from 16 to 87 years. Countries of origin:

Germany*	3
Persia	1
Greece	2
Israel	1
Great Britain	1
not known	4
Eastern Europe	45
Argentine*	1
Canada*	1

*One patient from Germany, as well as the patients from the Argentine and from Canada, hailed originally from Eastern Europe.

In 13 cases no operation was performed in the acute stage, as the volvulus righted itself after an ordinary or a barium enema. In 10 cases palliative operations were performed (i.e., reduction of the volvulus with cecostomy); in these the patients were either poor risks or senile. There were 7 deaths.

Primary resection was carried out in 36 cases; there were 4 deaths. The cause of death was postoperative shock in 1 case, postoperative volvulus of the jejunum in another case, and leakage occurring in 2 early cases.

The anastomoses performed were as follows: terminoterminal, 18; laterolateral, 11, and terminolateral, 7.

In 4 cases there were additional operations owing to megacolon, and various parts of the large intestine were resected.

In 1 case Svenson's radical operation was performed. Another patient had tuberculous peritonitis, which cleared up after the operation. In 1 case, that of a boy 16, who two years earlier had undergone sympathectomy somewhere else without effect, sigmoidectomy was performed. Six days later there appeared acute abdominal symptoms in the vicinity of the suture. Immediate laparotomy revealed gangrene of the appendix, which had become adherent to the suture. The postoperative course after due removal of the appendix was uneventful.

In 1 case the transverse and descending portions of the colon were resected.

In 3 cases there were peptic ulcers, and in 1 of these pyloric stenosis was present. This fact seems worth mentioning: though outside the frame of this paper it gives rise to the assumption that we have been dealing here with "the ulcer as second disease" in the sense of Roessle.

A man aged 82, who in another hospital had three times undergone retorsion with sigmoidopexy and cecostomy, has recently undergone a radical operation, in the event

course of which the cecostomy was closed.

In a recent operative case of primary resection there occurred postoperative bleeding with the formation of an infected intraperitoneal hematoma, i.e., abscess, which was cured by several punctures.

In 25 cases the patients complained of constipation and earlier slight attacks; in 10 cases the history was not typical, and in 13 cases no history was available.

ZUSAMMENFASSUNG

Es wird über 59 vom Verfasser beobachtete Fällen von Volvulus des Mesosigmoideums berichtet.

In 36 Fällen wurde eine primäre Resektion im akuten Stadium der Erkrankung ausgeführt.

Auf Grund seiner Erfahrung empfiehlt der Verfasser die primäre Resektion im akuten Stadium.

Die technischen Einzelheiten des operativen Eingriffs werden erörtert.

RÉSUMÉ

L'auteur rapporte 59 cas personnels de volvulus du mésosigmoide.

Dans 36 cas une résection primaire a été pratiquée à l'état aigu de l'affection.

Il résulte de l'expérience de l'auteur que la résection primaire est à recommander dans les états aigus.

Les détaile techniques de l'opératiôn sont disentés.

RESUMEN

El autor presenta 59 casos personales de vólvulo del mesosigma. En 36 de los casos se practicó resección del asa rotada dentro de la fase aguda. De acuerdo con la experiencia del autor la resección primaria es el tratamiento de elección.

Por último se describe la técnica operatoria.

SUMARIO

Noventa e nove casos de volvulos do mesosigmoide foram descritos e observados pelo autor. A resecção primaria foi feita em 36 casos na fase aguda. Dessa experiencia o A. recomenda a intervenção precoce. Os pormenores tecnicos são discutidos neste trabalho.

If my view of the function of philosophy is correct, it is the most effective of all the intellectual pursuits. It builds cathedrals before the workmen have moved a stone, and it destroys them before the elements have worn down their arches. It is the architect of the buildings of the spirit, and it is also their solvent.

—*Whitehead*

Extracorporeal Circulation in Deep Hypothermia: An Experimental Study

Blood Chemistry and Hemodynamic Changes; Behaviour of Cerebral Blood Flow

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TURIN, ITALY

RECENTLY many clinical and experimental researches have been devoted to the study of extracorporeal circulation combined with deep hypothermia in view of its use in open heart surgical procedures.[1] The problem has been thoroughly investigated in our institution. This report will deal with changes in humoral, hemodynamic and cerebral blood flow that can be observed in laboratory animals during the various stages of deep hypothermia combined with extracorporeal circulation.

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An experimental study of extracorporeal circulation in a patient under deep hypothermia is presented, with emphasis on blood chemistry and hemodynamic changes and the behavior of the cerebral blood flow. The authors' observations were meticulously recorded and are here presented in the form of charts and electrocardiograms.

Technic.—We used adult mongrel dogs. The animals were divided into two groups. In the first group the technic described by Drew[2] was employed.

The blood is aspirated by gravity from the right atrium in a reservoir (Fig. 1*A*), whence the blood is brought by a first pump (Sigmamotor) to the pulmonary artery. Through a second tube placed in the left atrium, the blood is collected, always by gravity, in a second reservoir. By means of another pump (Sigmamotor) blood is passed through a heat exchanger and then is brought back to the femoral artery.

In the second group we employed the heart-lung machine (Gibbon-Fiat)[3] in current use by our department, with a supplementary heat exchanger (Fig. 1*B*).

The blood is aspirated from the venae cavae, after which it reaches, by gravity, the venous reservoir of the apparatus. From there the venous pump (Sigmamotor) brings the blood to the oxygenator

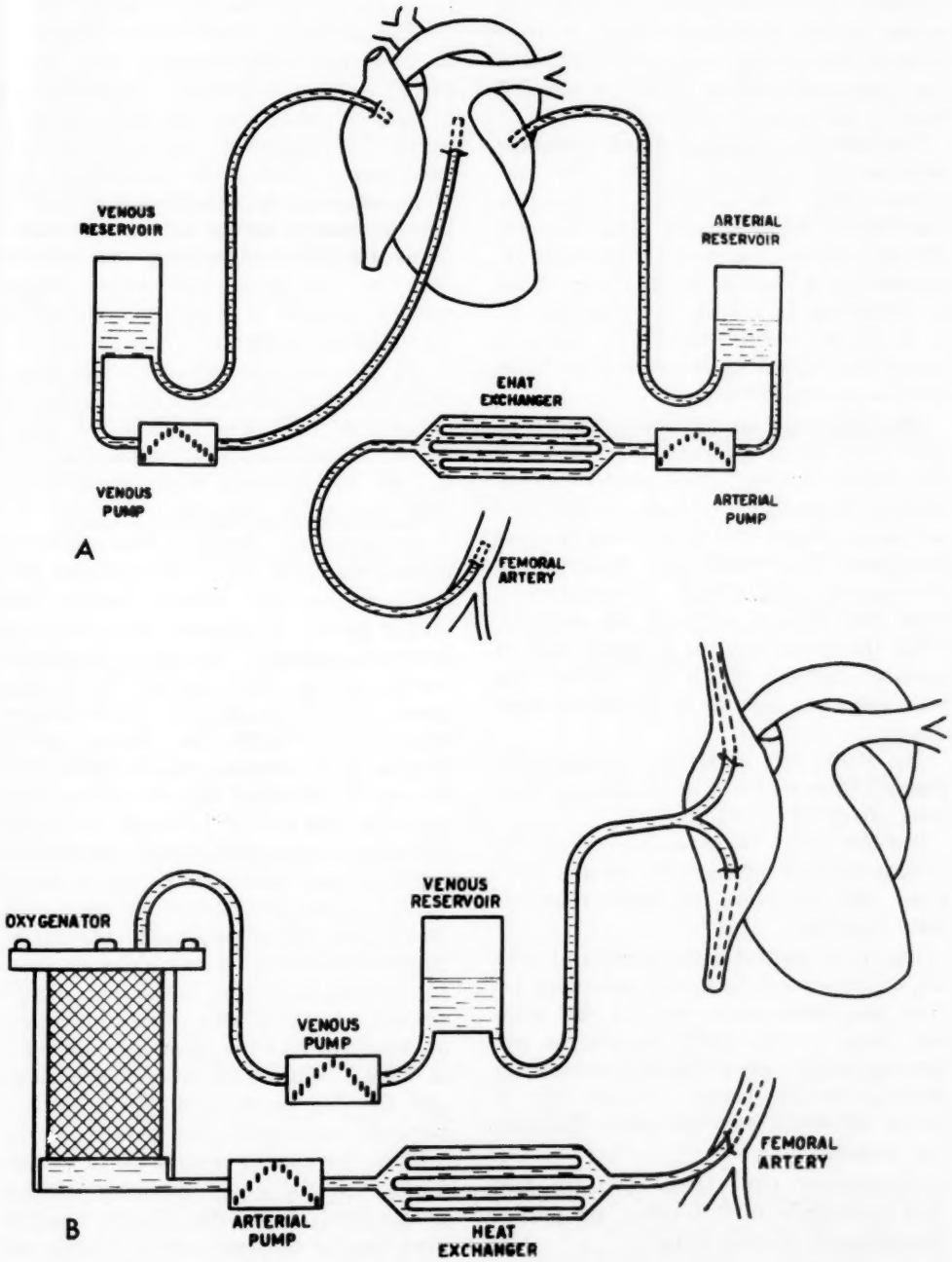

Fig. 1.—*A*, Drew's technic. *B*, pump-oxygenator technic.

(Vertical Screen Oxygenator).[4] From the bottom of the oxygenator blood is aspirated by the arterial pump and, through a heat exchanger and a filter, is brought back to the femoral artery.

Two different systems for heat exchange were used in our experiments. The first system (Fig. 2*A*) is made of stainless steel tubes with a smooth inner surface, 150 cm. long and 6 mm. in inner diameter, disposed in a parallel manner; the tubes are immersed in a bath in which cold (2 to 3 C.) or warm (43-44 C.) water is circulated, depending on whether the blood must be cooled or warmed.

The second system (Fig. 2*B*) is made of many couples of stainless steel plates 2 mm. thick. Between these plates are numerous chambers 1 mm. deep., 11 cm. wide and 49 cm. high. The blood flows in these chambers. The plates are immersed in the warm or cold bath as aforementioned. With this system, although the capacity being the same, there is a larger area of contact between blood and water; the heat exchange process is therefore more efficient.

By these two different technics the animals were cooled to an esophageal temperature of 12 to 10 C.

Results.—(a) *Thermic Curve*: The two groups showed comparable results, however, and therefore we shall illustrate them together.

Figure 3 illustrates the periods of cooling (about fifteen to twenty minutes) before the temperature reached the minimal level; at this point circulation was interrupted for about twenty minutes. A slightly longer period (twenty-five to thirty minutes) was necessary to warm the animals.

Throughout our experiments the flow was maintained at 80 to 100 cc. per minute per kilogram of body weight.

(b) *Circulating White and Red Blood Cells:* Figure 4*A* shows the behavior of the leukocytes and the erythrocytes during the two successive stages of the procedure. The red cell count changed very little: there was mild progressive diminution due to surgical blood loss not fully compensated. The white cells almost completely disappeared during the induction and maintenance of hypothermia, but the leukocyte count returned to normal values when the body temperature was brought back to the physiologic levels. Blood smears revealed no significant change in the leukocyte formula.

(c) *Nonprotein Nitrogen and Blood Sugar:* Figure 4*B* shows the changes in nonprotein nitrogen and blood sugar levels. The moderate variations are justified by the surgical procedure and are fully compatible with life.

(d) *Acid-Base Balance:* Figure 5*A* represents the blood p_H, carbon dioxide partial pressure and carbon dioxide combining power of plasma, determined by Astrup's method. Examination of the curves shows that during the cooling phase there is a gradual fall in plasma bicarbonates, while the plasma carbon dioxide level remains practically normal. The p_H of the blood falls to values ranging from 7.38 to 7.22. During the twenty minutes of circulatory arrest the acidosis becomes more accentuated (as is shown by the values obtained immediately after recovery of the circulation); the carbon dioxide combining power falls to 15 or 16 cu. mm. per liter; the carbon dioxide content of the plasma rises to 55 mm. of mercury, and the blood p_H falls (7.18 to 7.20). When circulation starts again and the dog is warmed, the acidosis is partially corrected: the carbon dioxide level in the plasma returns to physiologic levels, and the p_H of the blood rises to values from 7.3 to 7.35. Plasma bicarbonates, on the contrary, show a very mild increase (17 to 18 ml. per liter). On the whole, one may conclude that the acidosis

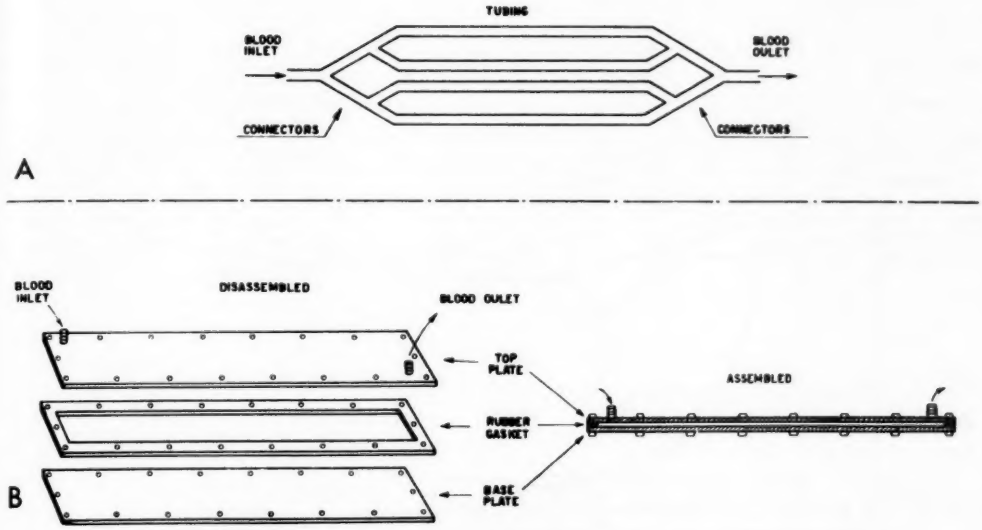

Fig. 2.—*A*, Drew's heat exchanger system; *B*, authors' new heat exchanger system.

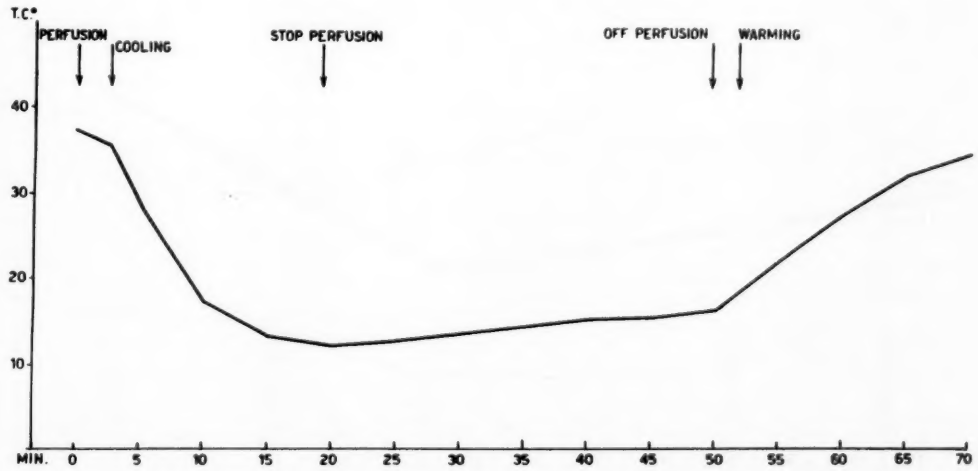

Fig. 3.—Record of temperature in a typical experiment with profound hypothermia.

observed is mainly metabolic and is particularly accentuated during the period of complete circulatory arrest. On the other hand, during this stage, owing to the arrest of respiratory function, there is also retention of carbon dioxide.

(e) *Plasma Proteins:* The behavior of the average values of total serum protein

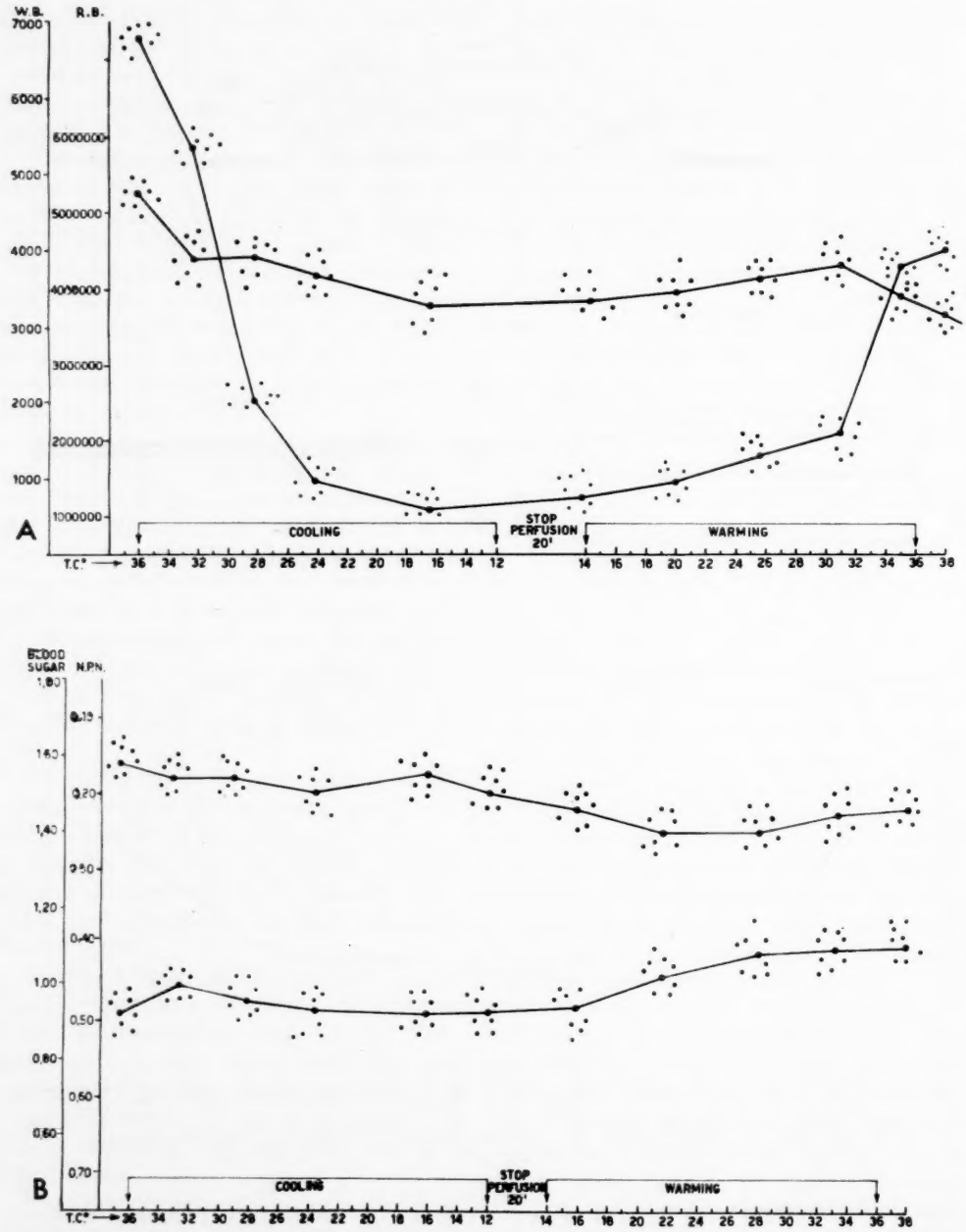

Fig. 4.—*A*, behavior of erythrocytes *(upper curve)* and leukocytes *(lower curve)* in experimental studies of extracorporeal circulation with deep hypothermia; mean values. *B*, behavior of blood nonprotein nitrogen *(upper curve)* and blood sugar *(lower curve)* levels in same studies; mean values.

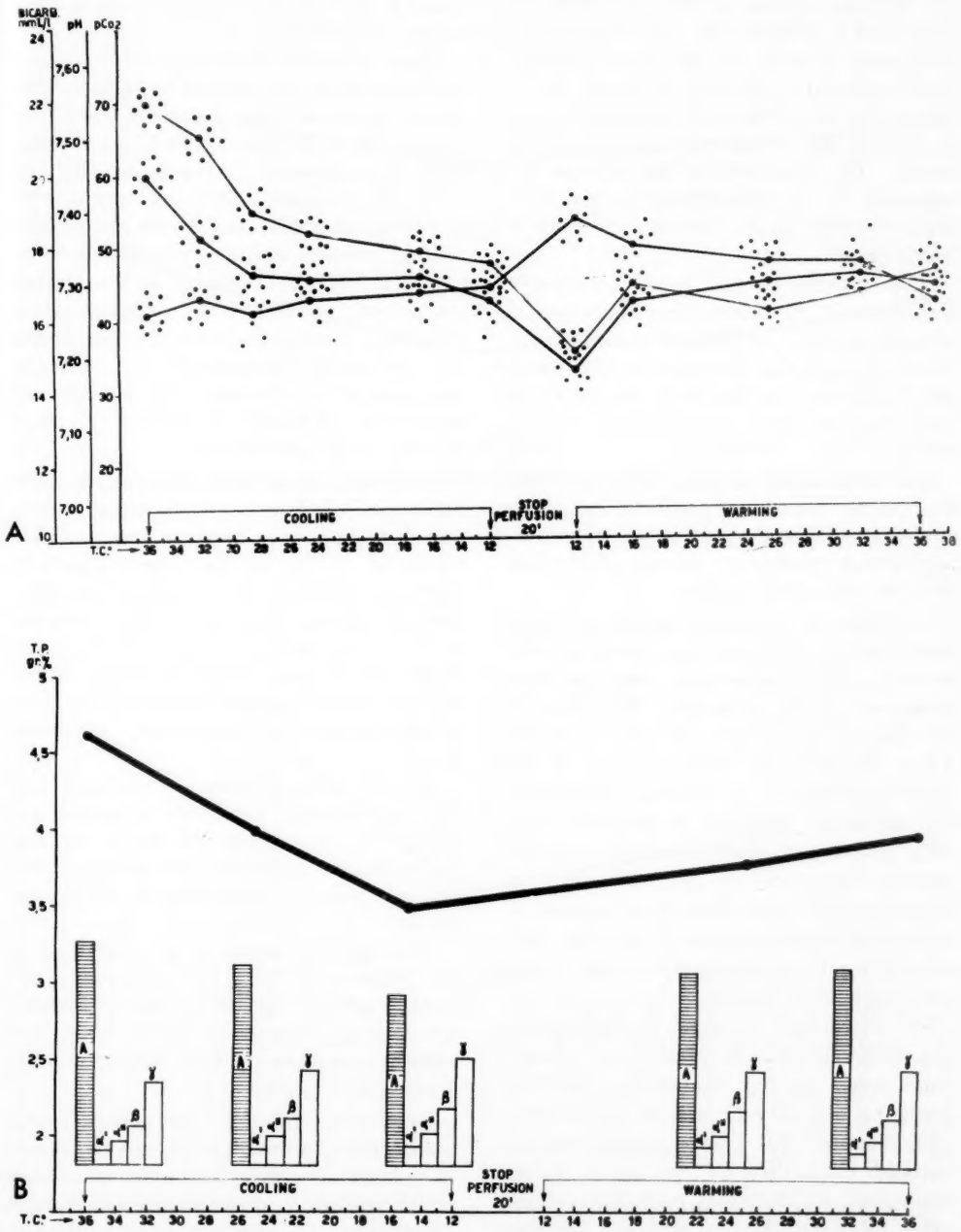

Fig. 5.—*A*, behavior of blood p_H *(lower curve)*, plasma carbon dioxide *(upper curve)* and bicarbonates *(central curve)*, milliequivalents per liter; mean values. *B*, behavior of plasma proteins; mean values.

and of the various proteic fractions is illustrated in Figure 5*B*. The determinations were carried out on blood samples drawn in basal conditions, at 25 and 15 C., during the induction of hypothermia and at 25 and 26 C. during the rewarming period. The total protein content was determined by a refractometric method; paper electrophoresis was used for protein fractionation.

Total plasma protein levels constantly decreased. At the same time there was a parallel increase of plasma globulin. On the other hand, the albumin fraction gradually increased as the body temperature rose, but it never returned to normal levels.

The diminution of circulating proteins is probably due to increased capillary permeability under the action of hypothermia, with a consequent leakage of albumin into the interstitial spaces.

An increase of plasma gamma globulin was observed. This increase, however, was proportionally higher than was the diminution of plasma albumin. This may be interpreted as a result of surgical stress. After the body has been warmed to the physiologic level, a normal circulatory and metabolic situation is restored. The return of albumin molecules into the blood stream, therefore, is favored, and the plasma protein level returns to normal. A persisting slight increase in gamma globulin may still be the result of the body's reaction to the trauma.

(f) *Electrolyte Balance:* We determined the variations of serum sodium and potassium levels during the cooling and rewarming phases with a flame photometer (Fig. 6, *A* and *B*). There is a constant and marked diminution of the serum potassium level, which is only partially restored after the normalization of body temperature.

The serum calcium level is also decreased, though to a lesser extent than serum potassium.

These marked variations of the electrolyte pattern are difficult to explain. One might speculate that they are based on changes in fluid spaces and blood volume, with a consequent intracellular shift of ions and, probably, with an increase of intracellular potassium. There are no significant changes in the serum sodium level.

The foregoing variations of the plasma electrolytic pattern in dogs during extracorporeal circulation under hypothermia are not easily understood. In fact, one can observe a constant and progressive diminution of plasma levels, as well as of all other humoral factors.

Furthermore, in the literature on metabolic variations during deep hypothermia (always, however, kept at the minimal values at 25 C.) we have been unable to find any reference to changes in the electrolytic plasma levels of the type observed in our experiments. (As far as we know, there are no data available in the literature on the changes induced by extracorporeal circulation under deep hypothermia).

At any rate, it may be assumed that the pronounced metabolic changes observed in our experiments might damage the capillary walls and the cellular membranes, thereby increasing their permeability.

This opinion seems to be confirmed by the observation that the electrolytic balance is greatly improved when the body temperature is brought back to 36 C. The entire process occurs in a very short time (one to two hours).

The most striking observation is the conspicuous variation in the plasma potassium level. This may be due to an increase of intracellular potassium resulting from the change of electrolyte concentration in the various hydric compartments.

g) *Oxygen Saturation:* The behavior of

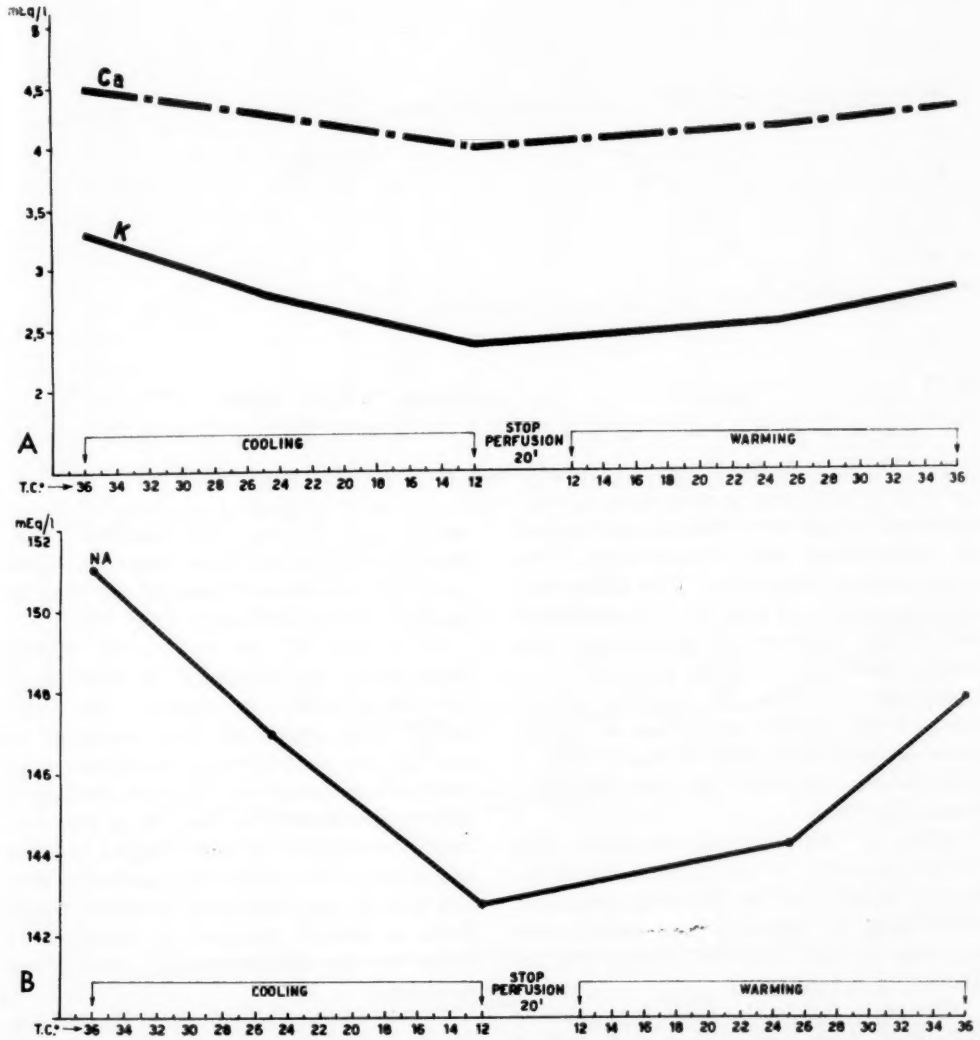

Fig. 6.—*A*, changes in serum calcium and potassium content caused by experimental studies of extracorporeal circulation and deep hypothermia mean values. *B*, changes in blood sodium; mean values, expressed in milliequivalents per liter.

the oxygen content of arterial and venous blood during the induction and regression of deep hypothermia, as determined according to Van Slyke and Nesth, is illustrated by figure 7*A*.

The oxygen content of arterial blood showed no significant variation throughout the experiments, either when blood was oxygenated at the pulmonary level or when artificial oxygenation was employed.

On the contrary, the oxygen content of venous blood showed considerable variations at different temperatures. While the animal was being cooled we observed a

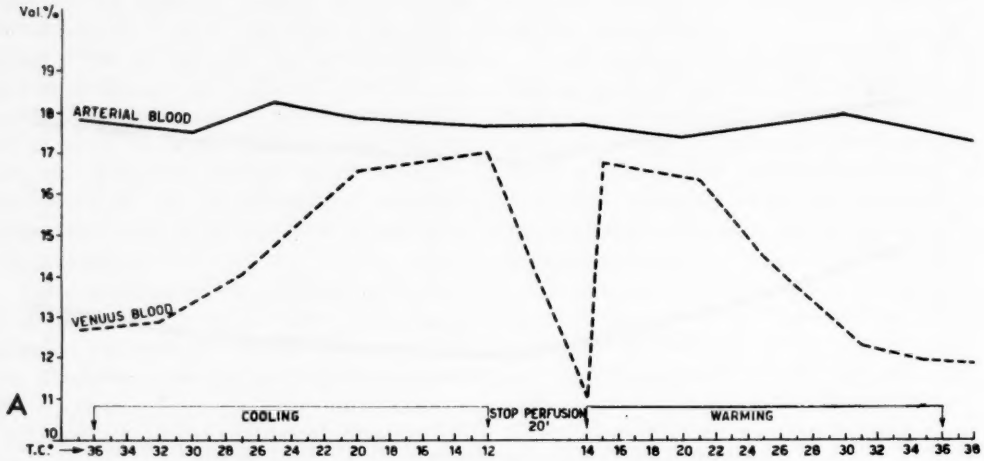

Fig. 7.—*A*, arterial and venous blood in typical experiment.

progressive increase in the oxygen content of venous blood, with a diminution of the arteriovenous difference. This difference, at temperatures of 2 to 13 C, immediately before the recovery of circulation, was always less than 1 volume per cent.

Immediately after the recovery of circulation the oxygen saturation of venous blood showed a decided decrease, with a simultaneous increase of the arteriovenous difference.

After a few minutes, however, the oxygen content of the venous blood increased again; in the following period of rewarming its behavior was exactly the opposite of that observed during the induction of hypothermia.

Obviously, while the body temperature is falling, there occurs a progressive diminution of oxygen utilization by the tissues. This does not, however, at temperatures of 12 to 13 C, prevent a progressive and marked desaturation of the venous blood when circulation is stopped. On the other hand, this situation is promptly reversed after recovery of circulation; the oxygen saturation returns to the normal level as the temperature rises.

(h) *Hemolysis:* The highest value observed was 87 mg. per hundred centimeters, which is much less than the values generally considered harmful for the organism (150 to 200 mg.) (Fig. 7*B*).

In Figure 7*C* the values for plasma hemoglobin are presented in relation to the perfusion flow per minute. The circulation time necessary for warming or cooling the animals was practically constant, since the size of the heat exchanger was proportionate to the size of the animal. Hemolysis was much higher in those experiments in which the perfusion flow per minute was high and in which, therefore, a greater number of passages of blood to the extracorporeal circuit was available.

It follows that hemolysis is due mainly to the mechanical trauma produced by the pump and to the passage of blood into the extracorporeal circuit; it seems also that hemolysis is little influenced by either the warming or the cooling process.

(i) *Electrocardiographic Data:* In Figure 8, *A*, *B* and *C*, are represented two typical observations commonly encountered during our experiments.

Under the action of cold the stage of cardiac arrest can be gradually reached

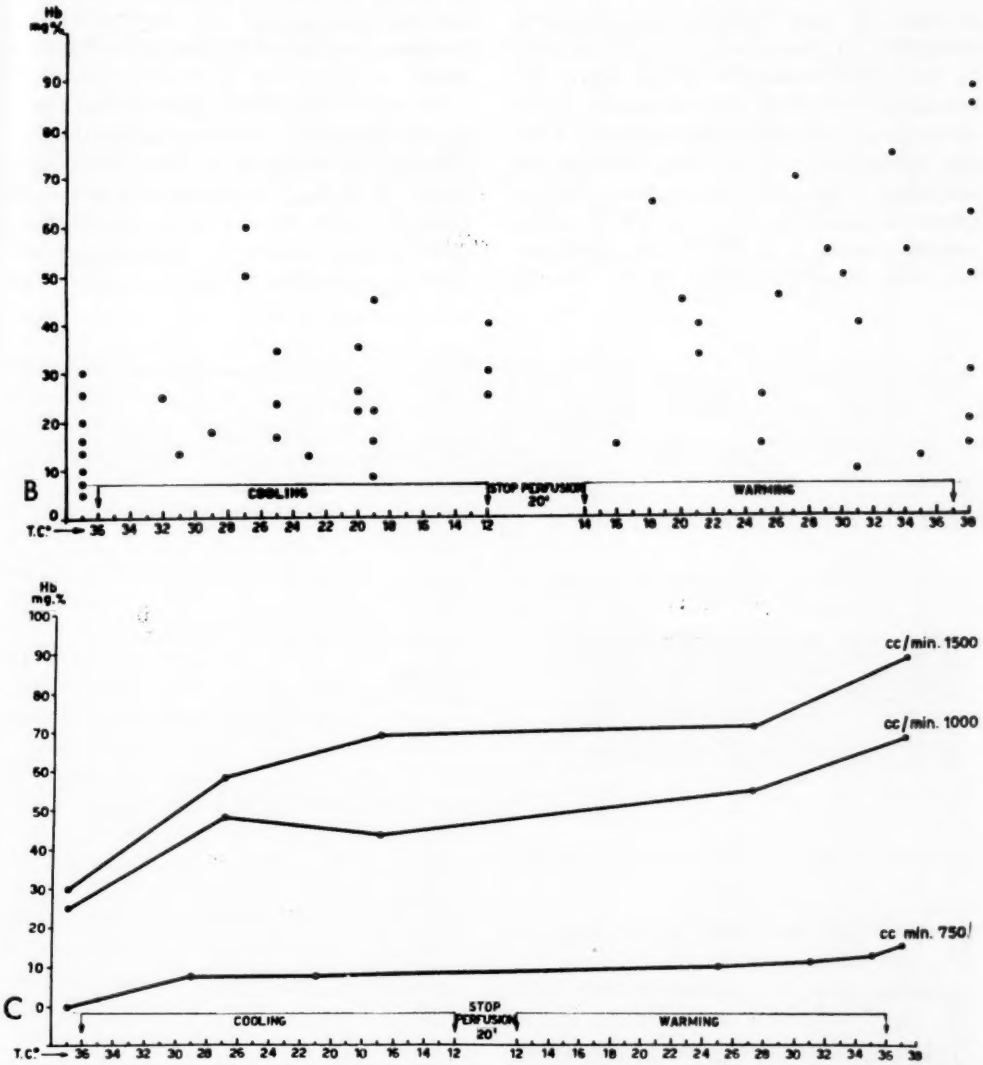

Fig. 7 (Cont.).—*B*, plasma hemoglobin production during experiments with deep hypothermia. *C*, hemolysis related to blood flow during experimental extracorporeal circulation with deep hypothermia; mean values.

through a number of electrical changes, not necessarily including ventricular fibrillation. As a rule, although not invariably, the administration of quinidine during the immediate preoperative period will prevent ventricular fibrillation.

This first group of tracings illustrates a case in which ventricular fibrillation never appeared throughout the different stages of the procedure.

One can observe a progressive diminution of the heart rate, with a parallel

decrease of body temperature; impaired conduction of the stimulus is also present. At the temperature of 20 C there did appear a complete arteriovenous block with a slow idioventricular rhythm. Cardiac arrest occurred at 15 C. During rewarming the idioventricular rhythm appeared again at 20 C; at 23 C, atrial activity reappeared, and a sinus mechanism was re-established at 26 C. During the warming period the cardiac rate increases, parallel with the body temperature.

In the second group of tracings (Fig. 8, *D* and *E*) one can observe, during the cooling period, the onset of ventricular fibrillation at 33 C. The electrocardiographic pattern varies according to the degree of hypothermia: while the temperature falls there is a gradual increase of the voltage

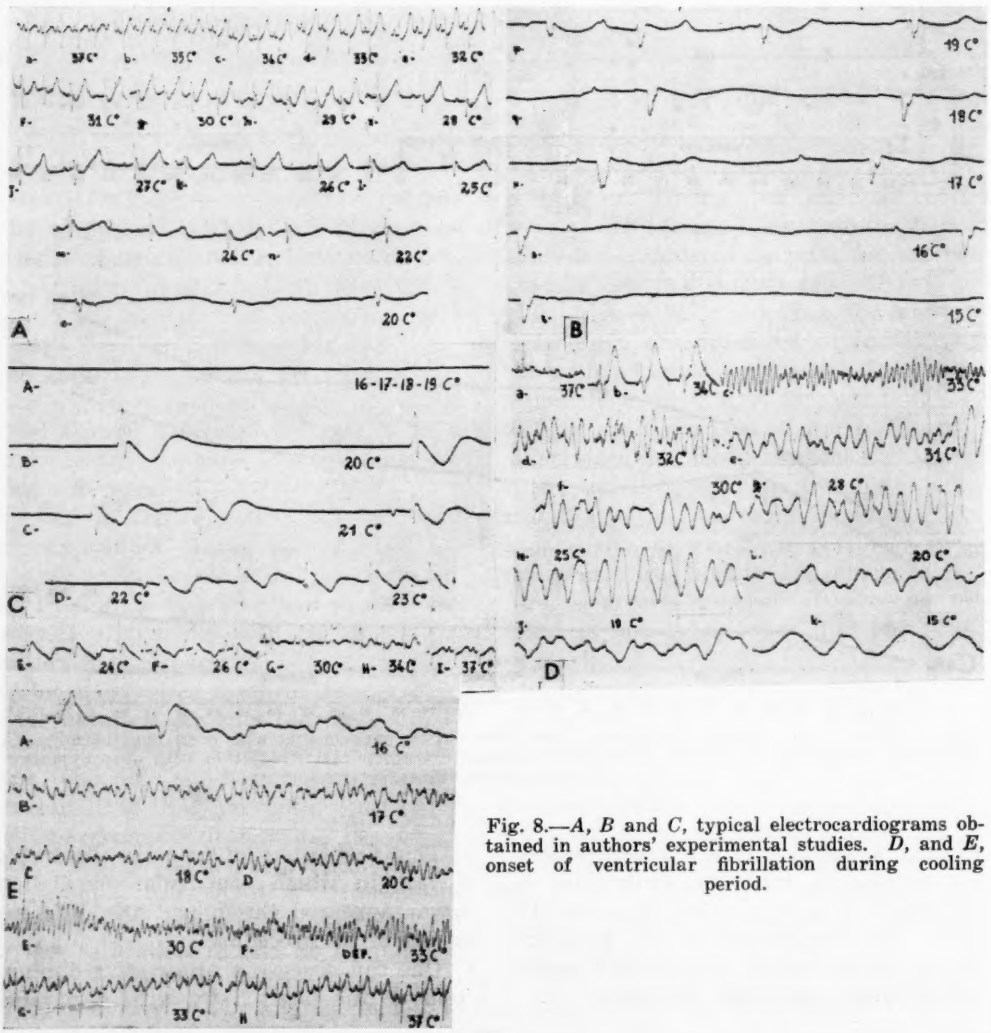

Fig. 8.—*A*, *B* and *C*, typical electrocardiograms obtained in authors' experimental studies. *D*, and *E*, onset of ventricular fibrillation during cooling period.

and a corresponding slowing of the wales of fibrillation. The opposite is observed during the following warming period: at 33 C defibrillation is performed, with recovery of a sinus rhythm.

(j) *Venous Cerebral Blood Flow and Systemic Blood Pressure:* The cerebral venous flow was determined by the Ingwary method.[6]

A polyethylene tube was inserted into the jugular vein and then pushed up to the jugular bulb. The blood dropping from the free end of the tube was collected and then directed into the femoral vein of the dog by means of a system of tubes and a pump. The drops fall on two platin electrodes (Fig. 9), closing at their passage a circuit connected with the time axis of an oscilloscope set up at a given rate. The shift of the electronic beam was recorded with a suitable camera to obtain a picture of a series of lines of different height and irregularly spaced. The curve that connects the peaks of the lines is the index of blood flow. Figure 10 is a tracing of the venous cerebral blood flow.

The height of the curve is indirectly proportional to the flow.

The behavior of systemic pressure, venous and arterial, and the variations of cerebral blood flow are illustrated in Figure 11. The cerebral flow, within certain limits, follows closely the changes in systemic pressure.

During the initial stage of cooling (from 38 to 29 C) one can observe a progressive and rapid fall of arterial blood pressure (from 150 to 90 mg. of mercury) and of cerebral venous flow (from 360 to 80 to 100 drops per minute). While hypothermia was progressing the fall in pressure and in the cerebral venous flow was more gradual: At 20 to 21 C the blood pressure became stabilized around 60 to 70 mg. of mercury, with a cerebral venous flow of 50 to 40 drops per minute. When circulation was arrested, the systemic

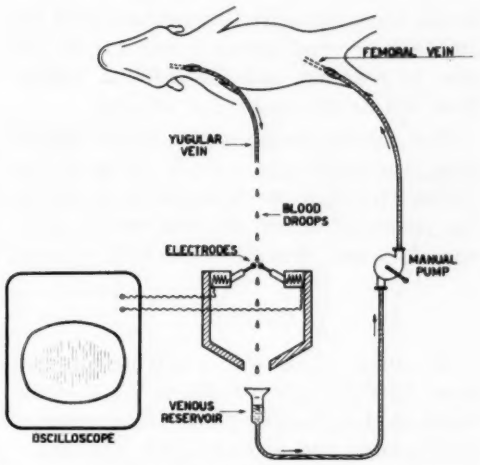

Fig. 9.—Ingvar method (drop system) of measuring cerebral venous blood flow.

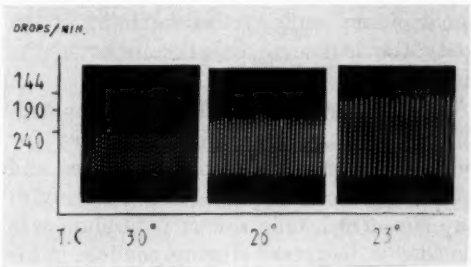

Fig. 10.—Tracing of cerebral venous blood flow.

pressure fell to zero and the cerebral venous flow was completely stopped.

At the beginning of the warming period, as soon as circulation was restarted, the blood pressure returned to the levels observed immediately before the circulatory arrest (60 to 70 mm. of mercury), while the cerebral venous flow showed a definitely notable increase (120 to 150 drops per minute).

In a subsequent phase, at temperatures ranging from 27 to 29 C, both the arterial blood pressure and the cerebral venous flow remained at the aforementioned levels; a definite and quick increase fol-

lowed when the body temperature rose (at 39 C the arterial pressure was 110 to 120 mm. of mercury and the cerebral venous flow 280 to 320 drops per minute).

The venous pressure showed no significant variation, its values ranging between 2.5 and 4 cm. of water; only during the period of arrest did the venous pressure fall, and then it fell quickly to zero.

COMMENT

It stems from our experiments that deep hypothermia (down to 12 C) produces in the laboratory animal pronounced biochemical and hemodynamic changes.

During the induction of hypothermia the leukocyte count gradually decreases. This is due to slowing of the circulation, with sedimentation of white cells along the capillary walls. After warming of the body the leukocyte count returns to the normal level.

The erythrocyte count showed no significant change, nor did the values for nonprotein nitrogen, blood sugar and plasma proteins. As far as electrolytes are concerned, only serum potassium was decidedly decreased during cooling. This hypopotassemia was corrected after the body had been warmed, a phenomenon probably due to a change in cellular permeability with a shift of potassium ions into the cells.

During our experiments a progressive increase in oxygen saturation of venous blood was observed, as a result of decreased consumption of oxygen by the tissues. After twenty minutes of total circulatory arrest, however, the venous blood showed a definite diminution of oxygen content, indicating that even at very low temperatures the tissues still need oxygen.

During the hypothermic stage an uncompensated increase in metabolic acidosis developed. Acidosis was most marked during circulatory arrest and showed a slight improvement during the warming stage. It is evident that the extracorporeal circulation, although elevated (80 to 100 cc. per minute per kilogram), is not adequate. Alternatively, it may be postulated that relative ischemia of some circulatory areas is produced during artificial circulation.

The initial effect of cooling on the electrical activity of the heart is represented by sinus bradycardia, with slight atrioventricular conduction delay. When the body temperature decreases further, the cardiac pacemaker gradually shifts from the higher atrial to the lower nodal and then to the ventricular centers. Cardiac arrest occurs at very low body temperature.

During the induction of hypothermia one can observe a progressive impairment of the conductive properties of the cardiac specific system; the electrocardiographic pattern changes from simple atrioventricular block to bundle branch block. Cardiac arrest is partially due to an extreme depression of conductivity.

During warming the foregoing cardiac abnormalities gradually disappear, following an inverse course. First, one observes an idioventricular rhythm with an increasing rate; a nodal rhythm then follows, and eventually a sinus mechanism is restored. Meantime the conductivity of the specific system improves, as is demonstrated by the gradual disappearance of the blocks at the branches and at the atrioventricular levels.

The hemodynamic picture is due to the intrinsic cardiac changes (with a low stroke output) and to diminution of the venous return. During the stage of deep hypothermia the blood pressure is very low, the circulation being sustained during this phase almost entirely by the artificial pump.

Blood pressure levels show progressive diminution during the induction of hy-

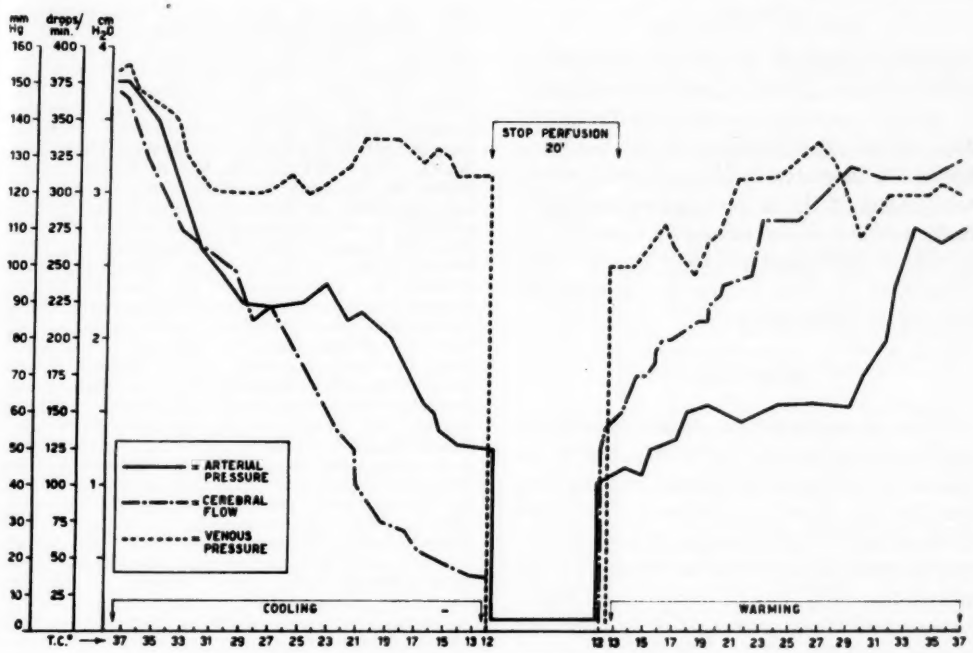

Fig. 11.—Behavior of systemic pressures and variations in cerebral blood flow during experiments.

pothermia. The lowest levels are reached during the stage of deep hypothermia, of the heart, circulation is maintained when, owing to the mechanical inefficiency only by the artificial pump. During the warming period the blood pressure levels gradually increase toward normal.

The drop in cerebral blood flow is a consequence of the fall in blood pressure. Similar observations have been made by Mayer, Stone and Denry during simple hypothermia. Direct observation of cerebral vessels during hypothermia has shown vasoconstriction, which certainly further decreases the cerebral blood flow. An increase of cerebral vascular resistance has been reported by other authors.[6]

During warming of the body, the cerebral flow increases more than does the arterial blood pressure. This may be due to the vasodilating action of catabolytes produced during the phase of circulatory arrest. When the extracorporeal circulation is started again, the blood pressure, although low, is sufficient to overcome the cerebral vascular resistance, and the cerebral venous flow therefore returns to relatively high levels.

ZUSAMMENFASSUNG

Es liegt eine experimentelle Untersuchung über die ausserhalb des Körpers erfolgende Zirkulation bei einem Patienten in tiefer Hypothermie vor. Besondere Beachtung erfahren die blutchemischen und hämodynamischen Veränderungen und das Verhalten des zerebralen Blutkreislaufs. Die Beobachtungen der Verfasser wurden sorgfältigst registriert und werden an Hand von Kurven und Elektrokardiogrammen dargestellt.

RÉSUMÉ

L'auteur présente une étude expérimentale sur la circulation extracorpórelle chez un malade en hypothermie profonde; il souligne les modifications chimiques sanguines et hémodynamiques, ainsi que le comportement de la circulation sanguine cérébrale. Les observations de l'auteur ont été méticuleusement relevées, et elles sont présentées ici sous forme de tableaux et d'electrocardiogrammes.

RIASSUNTO

Viene presentato uno studio sperimentale sulla circolazione extracorporea in un malato in ipotermia profonda, con particolare riferimento alle modificazioni chimiche ed emodinamiche del sangue e al comportamento della circolazione cerebrale. Le osservazioni degli autori sono state registrare meticolosamente e presentate in schemi e grafici.

RESUMEN

Se trata de un estudio experimental de circulación extracorpórea en un enfermo sometido a hipotermia profunda insistiendo especialmente en las alteraciones hemodinámicas y químicas de la sangre así como en el riego sanguineo del cerebro. Las observaciones de los autores han sido estudiadas meticulosamente y se presentan en forma de cuadrosy electrocardiogramas.

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We know that poisoned arrows are among the most ancient weapons in history. It is an indisputable ethnic truth that our civilization is based on lethal instruments. one of which is the "flying death," still the favorite weapon of certain primitive peoples. But the use of poisoned arrows goes back to paleolithic times. In 1857, in a cave in the Pyrenees dating back to the paleolithic era, Fintan discovered human fossils, in addition to the fossilized bones of animals now extinct. Among the latter he found arrowheads made of bone and deer horns, some of which contained grooves to hold poison. Later the Celts, Vandals, Gauls, Germans, Dacians, and Dalmatians of the Adriatic and the Danube used hunting weapons poisoned with vegetable juices and snake poisons.

Reference to poisoned arrows in mythology, literature, and history, as well as in the Bible, are as abundant as they are colorful. The poet of the Psalms (91:5) wrote, "Thou shalt not be afraid for the terror by night; nor for the arrow that flieth by day; nor for the pestilence that walketh in darkness: nor for the destruction that wasteth at noonday." In the Book of Job we find, "Because the arrows of the Almighty have pierced me and my soul is drinking their poison."

According to Greek legend, contagious diseases and other types of sickness were caused by invisible arrows shot by malign gods and destructive demons. It was an angry Apollo who, with his bow, shot an arrow "causing pestilence" among the Greeks. . . .

Certain tribes of Africa and Asia used arrows poisoned with substances causing inflammatory reactions. In Moorish Spain, some parts of Asia, Nepal, Burma, and Yunnan, the poisons used were of the aconite type affecting the respiratory system. Arabic Spain, Togoland, Bagana, Bonga, Somaliland, and Wataita, as well as certain tribes of Africa, Cochinchina, Malacca, Sumatra, Bali, and the Philippines, used poisons affecting the heart. The Bushmen and Basutos in Africa and the aborigines of the Solomon Islands and New Hebrides used poisons causing convulsions, and, of course, there was the paralyzing type of poisons used by tribes in South America.

—Marti-Ibañez

Hypothermic Perfusion for Open-Heart Surgical Procedures

Report on the Use of a Heart-Lung Machine Primed with Five Per Cent Dextrose in Water Inducing Hemodilution

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Stripped of the awe-inspiring and intimidating complexity of the heart machine age with controls and monitoring devices resembling the dashboard of an atomic submarine . . . he may make the greatest discovery of all, that he (has to be) . . . to operate inside the heart, but just a good doctor . . . who has the technical skill to repair a hernia.

—Frank Gollan

A system of hypothermic perfusion for open heart operations has led to the clinical use of a heart-lung machine primed with 5 per cent dextrose in water. The pumping of this priming fluid induces moderate hemodilution. The advantages are discussed. The blood lost from the surgical field is replaced with ACD blood drawn within five days of its administration.

HYPOTHERMIC perfusion simplifies many of the technical problems associated with open heart surgical procedures,[1] and it was through its experimental and clinical application[2] that a heart-lung machine primed with 5 per cent dextrose in water was developed.

Method.—1. *The Double-Helical Reservoir Bubble Oxygenator and the Gravity Drainage Cardiotomy Return System*: The system consists of modifications of the basic principles of a bubble oxygenator as proposed by DeWall.[3] Venous drainage is accomplished by means of two Bardic catheters. One is threaded into the inferior vena cava through the femoral vein or the right auricular appendage and the other into the superior vena cava through the right auricular appendage. Drainage takes place directly into the lower end of the vertical oxygenating tube, where it is mixed with 100 per cent oxygen regulated at a flow that permits a slowly rising column of bubbles. The initial "debubbling" is done in a stainless steel cannister filled with stainless steel mesh sprayed with Dow Corning Antifoam A. The blood then enters the Mayon Helix in which an inner stainless steel helix ½ inch (1.2 cm.) in diameter is placed. Cold or warm water is pumped through the inner coil to warm or cool the blood. The double-helical system acts as a reservoir, a bubble

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separator and a heat exchanger.[4] The blood then enters the Mayon Helix in filter and a Sigmamotor pump into the femoral artery.

Cardiotomy return system employs the gravity drainage as indicated in Figure 1, and thus a pump is eliminated.

The priming volume of the helix and arterial limb is equivalent to about one third of the fluid requirement for twenty-four hours at the rate of 2 cc. per kilogram of body weight per hour. Such low volumes anticipated the use of 5 per cent dextrose in water for priming, and this has been recently employed.

2. *Preparation and Sterilization of the Heart-Lung Machine*: The stainless steel coil is first washed with green soap and a soft lint-free cloth, then with a 1 per cent solution of sodium and finally rinsed under running tap water. It is threaded into the plastic helix, with 6 to 8 inches (15 to 20 cm.) extending beyond the ends of the Mayon tubing. The double helix is autoclaved in double wrappers for thirty minutes at 250 F. under 20 pounds (9.1 Kg.) of pressure. It is dried for two to three hours in the autoclave; the steam is then turned off and the autoclave allowed to cool before the double helix is removed. The remainder of the tubing is prepared as described by DeWall.[3]

3. *Technic of Perfusion*: A rate of blood flow at approximately 20 cc. per kilogram of body weight is used. The highest rate has been 1,500 cc. in a man weighing 92 Kg. The midintraesophageal temperature is rapidly decreased about 0.5 to 3 C per minute to the desired level, which varies from 20 to 30 C, depending upon the lesion to be corrected, the condition of the myocardium and the length of time estimated as required for the corrective procedure.[2] The venae cavae are occluded just prior to aortic occlusion and the reparative surgical procedure. Simple aortic occlusion for periods varying between fifteen and twenty-five minutes at a time provides an empty heart and helps to prevent air embolism.[5] Ice chips in the pericardial sac and perfusion of the coronary arteries are added safety features when prolonged occlusion is required, as in the replacement of the aortic leaflets. Warming takes slightly longer, and this extra partial cardiopulmonary bypass following correction of the defect has been considered beneficial. Heparin is given intravenously prior to cannulation and is counteracted by Polybrene at the end of perfusion. Blood volume is kept constant by an accurate blood balance computation.

Clinical Management and Results.—The clinical management and results obtained in 43 consecutive patients who underwent open heart operations with hypothermic perfusion and use of the blood-primed double helical reservoir heart-lung machine will be analyzed.

1. *Psychological Preparation*: Patients are familiarized with their environment and nurses prior to the operation and are told explicitly what to expect. The postoperative cooperation of the patient is thereby improved, and it is our opinion that a happier and more speedy recovery is obtained.

2. *Anesthesia*: Premedication consists of the administration of Nembutal, Demerol and Scopolamine to adults and Demerol and Scopolamine to children. Induction and intubation are carried out with intravenous Thiopental and Succylcholine for adults and by inhalation of nitrous oxide and Fluothane for children. Maintenance anesthesia is obtained with 70 per cent nitrous oxide and oxygen supplemented with curare. During hypothermic perfusion all anesthetic agents are discontinued, and after the occlusion of the venae cavae the patient is gently "ventilated" with a humidified 60 per cent helium and oxygen combination. The addition of helium was instituted after the

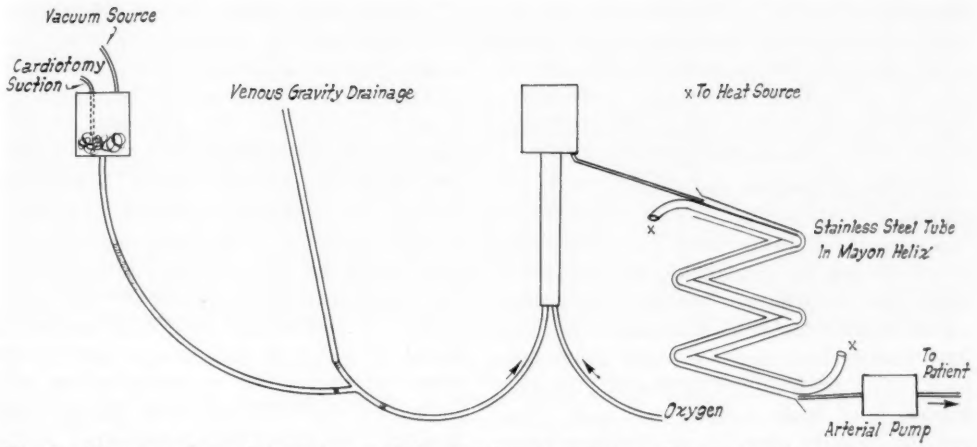

Fig. 1.—Diagram of complete system used for open heart operations. The machine is primed with 5 per cent dextrose in water.

death of Patient 8 from severe bilateral pneumonia. High oxygen tension may rapidly damage the alveoli of lungs that have no pulmonary blood flow.[6] At completion of the operation the patient's response is usually prompt and sufficient to enable him to obey verbal commands while still on the operating table. Postoperative evidence of curarization has usually been absent. Esophageal temperature at the termination of anesthesia is usually 34 to 35C. There has been no noticeable difference in the response of patients who underwent hypothermic total body cardiopulmonary bypass with a blood-primed heart-lung machine and those in whose cases a machine primed with 5 per cent dextrose in water was employed.

3. *Anticoagulation and Postoperative Hemorrhage*: Heparin, 1.5 to 2 cc. per kilogram of body weight, is given intravenously as a single dose just prior to cannulation. No additional amounts have been used, the longest perfusion having lasted one hundred and eighty-nine minutes. Smaller amounts may prove adequate, but postoperative hemorrhage has not been a problem. At the end of the perfusion 1 mg. of Polybrene is used for each 1 milligram of heparin. Postoperatively, the total drainage from the chest ranged from 130 to 1010 cc. with an average of 433 cc. (11.4 cc. per kilogram), as measured by a system described elsewhere.[7]

4. *Flow Rates and Tissue Anoxia*: Clinical response and survival are at present the best retrospective criteria for a successful total body perfusion. Even though direct arterial blood pressure, electroencephalographic data and the oxygen saturation of the peripheral blood have been continuously monitored during the perfusions, the only information gained is that 20 cc. per kilogram of body weight per minute maintains these at adequate levels.[1c] Immediate awakening and excellent clinical response indicate the safety of these low flows at intraesophageal temperatures varying from 20 to 30C. Venous blood flow by gravity during internal hypothermia is about 20 cc. per kilogram of body weight at 30C.[8] These rates of flow have proved adequate to warm the body and maintain oxygenation of the tissues while the injured cold heart is gaining strength and warmth. That is one of its major differences from external hypo-

thermia, with which the cold heart has to supply the suddenly increased oxygen need of the periphery of the body. Tissue anoxia is not a problem in hypothermic perfusion, despite the fact that the oxyhemoglobin dissociation curve is shifted to the left.

5. *Renal Function and Urinary Observation*: No elaborate tests of renal function have been performed. The output of urine during the perfusion, as measured with an indwelling bladder catheter, varied from 5 to 50 cc. The output for the first twenty-four hours ranged from 285 to 1,150 cc. with a fluid intake of 2 cc. per kilogram of body weight per hour. The specific gravity showed no constant relation to volume. The only gross change in some cases was the precipitation of amorphous urates. Microscopically there were transient changes, which included hematuria (85 per cent), albuminuria (85 per cent) and glycosuria (40 per cent). They were mild in about 60 per cent of the cases, and in all cases there was reversion to normal within one to three days. The response to mercurials and other diuretics in the postoperative period was apparently normal.

6. *Blood Elements and Hemolysis*: Despite the accurate blood replacement, the hemoglobin level and the hematocrit reading do decrease a few days after an open heart operation. The life expectancy of the red cells under the use of a heart-lung machine is reduced. Gollan[2a] has stated that the resistance of red blood cells to hemolysis is increased at low temperatures.[2a] In addition, the low rates of flow used decrease trauma and thus permit prolonged perfusions. Table 1 presents data on the breakdown of bank ACD blood at 25C when it is pumped through the heart-lung machine, without perfusion of the experimental animal, for one hour with a flow of 250 cc. for 500 cc. of reservoir blood. The rise in the plasma hemoglobin level* at the end of a perfusion in man varied between 8.3 and 47.65 mg. per hundred cc., the latter being measured at the end of a perfusion lasting one hundred and eighty-nine minutes.

7. *Simple Aortic Occlusion and Ventricular Fibrillation*: Simple aortic occlusion for periods varying from fifteen to twenty-five minutes at a time provides an empty, "motionless" heart and prevents air embolism. Fibrillation may occur, but this is of no consequence.[5] Electroshock usually suffices to restore a regular ventricular rhythm, and at a midintraesophageal temperature of 34C a 1:1 atrioventricular response is obtained. The relative safety of simple aortic occlusion at low temperatures has been demonstrated by Hegnauer and D'Amato, who showed that the oxygen

*Technic of Grosby and Furth.[10]

TABLE 1.—*Plasma Hemoglobin in ACD Blood Collected in Siliconized Bottles.**

Bottle No.	Age of Blood, Days	Rate of Flow	Plasma Hemoglobin, mg.%			Platelet Count, cu. mm.		
			Start	30 min.	60 min.	Start	30 min.	60 min.
F 5742	1	250 ml/min.	44.5	62.3	80.1	206,000	186,000	178,000
F 5766	1	250 ml/min.	20.3	39.1	53.4	212,000	200,000	196,000
F 5720	4	250 ml/min.	22.3	65.5	89.3	188,000	178,000	158,000
F 5701	5	250 ml/min.	15.7	58.9	98.5	202,000	186,000	168,000
F 5902	3	250 ml/min.	9	89.2	106	143,000	129,000	118,000
F 5866	4	250 ml/min.	8	48	58	117,000	110,000	106,000
F 5935	2	250 ml/min.	12.5	35	40	196,000	187,000	182,000

*Plasma hemoglobin and platelet count are reported after 1 hour run through the HLM, at a flow of 250 cc. per minute, for a 500 cc. reservoir.

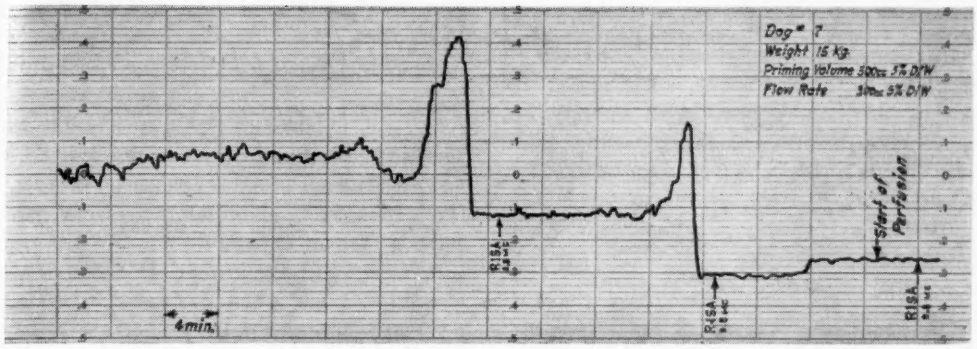

Fig. 2.—Abbreviated actual recording of the fate of 5 per cent dextrose in water priming volume when pumped into a dog. Note original hemodilution, which is more or less maintained for the duration of perfusion. This is ascertained by additional injections of radioactive iodinated albumin. Calculated rise in counts, as if hemodilution persisted, corresponds to continuous recorded levels.

consumption of the heart decreases by one-half at 30C and by more at lower temperatures.[9]

8. *Experience with the Heart-Lung Machine Primed with 5 Per Cent Dextrose in Water*: Simplification of the heart-lung machine was predestined when hypothermic perfusion came into use.[10] After using a machine primed with 1 to 3 pints of blood, and after experimental analysis and evaluation, the final step of priming with 5 per cent dextrose in water was taken. It has been used on 68 patients weighing 7.9 to 72 Kg. with no noticeable harmful effects. The priming volume of 5 per cent dextrose in water (weight in kilograms × 16 cc.) is pumped into the patient, bringing about hemodilution.[11] This fluid remains, for the most part, in circulation during the cardiopulmonary bypass. This is shown by the continuous recording, through a limb attached to the venous drainage tube, of radioactivity emanating from iodinated albumin given prior to perfusion (Fig. 2). Thus, the patient has a normal circulating volume permitting a smooth perfusion, and the decrease in his red blood cell mass is well tolerated as the temperature is rapidly lowered. Most of this hemodiluting 5 per cent dextrose in water, however, disappears rapidly from circulation during the first hour following perfusion. The total amount of fluid during the first twenty-four hours is calculated at 2 cc. per kilogram of body weight per hour and includes the amount of fluid used for priming. Replacement of the blood usually lost from the surgical field[5] is done with banked citrated blood drawn in siliconized bottles.*

The physiologic data recorded during these human cardiopulmonary bypasses are similar to those seen during hypothermic perfusion as aforedescribed and elsewhere reported.[4] Oxygen consumption in this range of intraesophageal temperature averaged 1.24 cc. per kilogram of body weight. The safety of the technic is convincing, but the compilation of a larger series is needed for proper assessment.

Table 2 summarizes the important data on the first 43 patients who underwent hypothermic perfusion and open heart surgery with the blood-primed double helical reservoir apparatus. Table 3 summarizes the data on the first 55 consecutive patients who had hypothermic total cardio-

*The routine in the Community Blood Bank in Oklahoma City.

TABLE 2.—*Data on 43 Consecutive Patients who Underwent Open Heart Operations with Hypothermic Body Cardiopulmonary Bypass. 35 Consecutive Survivals; Blood-Primed Double Helical Reservoir Used*

Defect	*No. of Cases*	*Mortality Rate*	*Age, Years*	*Weight, Kg.*	*Pump Time, Min.*	*Aortic Occlusion, Min.*	*Perfusion Rate Cc./Kg./Min.*
Ventricular	11	0	1-25	12-59	29-100	4-40	20
			8	19	71	21	
Atrial	10	0*	4-47	17.5-70	28-88	5-24	20
			31	43	41	12	
Pulmonary stenosis**	8	0	4-28	14.5-92.1	29-150	0-32	20
			10.5	37	57.5	7.5	
Mitral disease	5	0	21-52	43-60.8	30-81	9-24	20
			35	49	69	17	
Tetralogy of Fallot	7	2	4-29	16.3-65	61-154	22-90	20
			8	106	106	32	
Aortic stenosis†	2	0	18-27	49-71	91-96	20-11	20
Total	43	2					

*One patient died four months after successful repair. Autopsy revealed intact cardiac repair and acute pancreatitis.

**One patient had anomalous venous drainage of the right superior pulmonary vein, and another had an interatrial defect. Both were repaired. Four patients required right ventricular outflow tract patches of Ivalon.

†One patient had coarctation of the aorta at the level of the coronary arteries, which was corrected by roofing the aorta with a patch of Ivalon.

pulmonary bypass with the 5 per cent dextrose in water primed heart-lung machine inducing hemodilution.

TABLE 3.—*Clinical Experience with Hypothermic Perfusion in 30 Consecutive Patients Treated by Cardiopulmonary Bypass with Use of the Double-Helical Reservoir Heart-Lung Machine Primed with 5 Per Cent Dextrose in Water*

Defect	*Cases*	*Patients Living*
Interatrial defect	10	10
Interventricular defect	14	13
Pulmonary stenosis and infundibular stenosis	5	5
Mitral disease	17	16
Aortic stenosis	4	3
Coarctation of base of aorta	3	3
Atrioventricularis communis	1	0
Mitral disease and aortic disease	1	0
	55	50

COMMENT

The changes that occurred in our double helical reservoir system have been described.[12] The current use of a heart-lung machine primed with 5 per cent dextrose in water and the replacement of blood lost with ACD blood has solved many of the problems connected with open cardiac surgery. The special preparation and use of large amounts of blood for priming machines of different types are no longer necessary. The cost of the apparatus is small, about $200 plus the price of a single-headed pump. It can be autoclaved, and most of it is disposable. This is due to two factors. First, hypothermic perfusion allows lower rates of flow, which means heart-lung machines of lower capacity. Second, as the body temperature is selectively lowered, the patient's red blood cell count can be decreased by pumping the

priming volume of 5 per cent dextrose in water, without harmful effects. As most of the blood in the apparatus is returned to the patient at the end of the procedure, the red cell count is restored.

Hypothermic perfusion, lower rates of flow and decreased trauma permit lengthy total body cardiopulmonary bypass. Total appraisal of complicated defects is accomplished and, as has been stated, the continuation of perfusion for some time after closure of the cardiac chamber may be partially responsible for the excellent behavior of the heart. Simple and relatively prolonged aortic occlusion is a great help in simplification of the technic but may not be the complete answer. The blood "trickling" technic suggested by Gollan[8] may prove valuable. The advantages cited for direct blood cooling without the use of an oxygenator are nullified by the present technic. Most modern open heart operations can be performed with 1 to 3 pints of blood.[13]

ZUSAMMENFASSUNG

Ein System hypothermischer Durchblutung bei offenen Herzoperationen hat schliesslich zur klinischen Anwendung einer mit fünfprozentiger wässriger Dextroselösung betriebenen Herzlungenmaschine geführt. Das Blut wird aus einer Blutbank ersetzt und muss innerhalb von fünf Tagen vor seiner Anwendung gewonnen sein.

RÉSUMÉ

Un système de perfusion hypothermique dans les opérations à coeur ouvert, a nécessité dans certains cas l'utilisation clinique d'un appareil coeur-poumon amorce avec 5% de dextrose dans de l'eau. Le sang est remplacé par du sang stocké ACD, prélevé dans les cinq jours précédant son administration.

RIASSUNTO

Un metodo di perfusione ipotermica per gli interventi a cuore aperto ha condotto all'impiego della macchina cardio-polmonare con soluzione acquosa di detrosio al 5%. Il sangue viene sostituito con sangue ACD prelevato entro 5 giorni dalla somministrazione.

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As soon as any of the advanced or radical sex philosophers find their views challenged, they immediately sweep the enemy aside by a contemptuous reference to "Victorian prudery." This I disclaim for myself. I am perfectly willing to discuss sex in the frankest and freest way with anyone at any time. Nor will my discussions be tinged with any ecclesiastical or religious bias. For good or for bad I cannot subscribe to the doctrines of any religious organization on earth, and in *Who's Who* I am listed under the somewhat sophomoric classification: "Freethinker."

But I do not believe that sex is the only interesting subject on earth, nor am I willing to discuss it all the time, for ever and ever. It is a perfectly natural and very dynamic force, but not so many things hinge on it as is generally announced. Its association with religion is purely arbitrary; and it is quite as unfortunate that liberal clerygmen should feel that they have to support easy divorce because they have lost faith in the virgin birth, as that orthodox priests should oppose any divorce because they pronounce rigid marriage sacraments. The question should be judged on biological, social, and economic, not religious, grounds.

—*Clendening*

Neurologic Surgery

A Conservative Method of Treatment for Cerebrovascular Insufficiency

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Intravenous injections of procaine with injectable Benadryl have proved definitely valuable in the treatment of cerebrovascular thrombosis, spasm, embolus or stricture. This combination of drugs can also be adapted to an office procedure. Physiotherapeutic and rehabilitative measures are carried out in the usual manner.

CEREBROVASCULAR thrombosis, or insufficiency, may be treated conservatively and efficiently by general practitioners. The material used in this series of cases was procaine hydrochloride or procaine with injectable Diphenhydramine hydrochloride (Benadryl**). Diphenhydramine hydrochloride is a white crystalline water-soluble powder that has a pronounced potentiating effect[1] on procaine and will combat any allergic manifestation to this drug.

This method of treatment was employed in 190 cases in which the patients presented occlusion or partial occlusion of a cerebral vessel by thrombus, embolus, spasm or stricture.

The type of patient to be so treated is the one who has had a sudden onset of paresis or paralysis with no loss, or transient loss, of consciousness. The cause is postulated essentially by clinical means. Roentgenograms of the skull and chest are taken to rule out secondary neoplasm. The patient's cardiac status is appraised, and if embolus is the cause of the cerebral condition the cardiac condition is treated.

The paresis or paralysis will respond to the following method of treatment: A daily infusion of 1/10 per cent procaine in 500 cc. of physiologic solution of sodium chloride with 2 cc. of injectable Benadryl is given intravenously at the rate of 50 drops per minute. This infusion can be given for ten to fifteen days. Return of function will be evident within the period covered by the first seven infusions. At least ten infusions, however, should be given to every patient. In some cases there will be pronounced improvement while the infusion is running into the vein; the patient will suddenly find that he can move a paralyzed limb.

In addition to the foregoing points, large doses of Vitamins B and C should be given. There are many such preparations that can be added to each infusion with safety.

The patient may often feel somewhat dizzy if the infusion is run too quickly. Should this occur, the rate of infusion is slowed down.

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**Injectable Benadryl supplied by Parke, Davis & Company.

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During a period of five years, well over 2,000 such infusions were administered, with no ill effect[1] except dizziness.

The mechanism of action is not definitely known. It is my opinion that cerebral edema is reduced and blood flow enhanced by the patent, functioning vessels in the area and by a hypothalamic effect.

For the "small strokes of Alvarez," the treatment may be so modified as to be employed as an office procedure. In the patient who complains of sudden onset of transient paraesthesia or paresis, the following method can be used: Ten cc. of 1 per cent procaine hydrochloride, without ephedrine, to which 2 cc. of injectable Benadryl has been added, is injected intravenously. At least one full minute should be taken for the injection, and it should be repeated daily for ten to fifteen days. In the series here reported, all patients so treated were free of symptoms for periods ranging from six months to three years; many never had any recurrent complaints.

If the patient is dizzy, the injection is administered more slowly. The use of "smelling salts" will overcome the dizziness. The patient should be kept in the office for fifteen minutes after the infusion.

I have not used anticoagulants in conjunction with this method, despite the somewhat enthusiastic reports of their beneficial results in cases of cerebrovascular insufficiency. To my mind, anticoagulants present a real danger of converting a nonhemorrhagic condition into a hemorrhagic one.

Seventy-three patients were used as controls. They were treated by bed rest, a high vitamin intake and physiotherapy. The controls were decidedly slower in recovering function, and recovery was noticeably less complete, than were the patients treated by intravenous procaine, injectable Benadryl and Vitamins B and C.

Physiotherapeutic and rehabilitative procedures should be carried out as usual and may be instituted after the seventh infusion.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Die intravenöse Infusion von Novocain mit Benadryl hat sich von einwandfreiem Wert in der Behandlung von Thrombosen, Spasmen, Embolien oder Strikturen der Hirngefässe erwiesen. Die Kombination dieser beiden Mittel lässt sich auch in der Sprechstunde anwenden. Die Massnahmen der physikalischen Therapie und Rehabilitierung sollen in der üblichen Weise durchgeführt werden.

RÉSUMÉ ET CONCLUSIONS

Les infusions intraveineuses de chlorhydrate de procaïne avec du Benadryl injectable se sont révélées très précieuses dans le traitement des spasmes, embolies ou rétrécissements cérébrovasculaires. Cette combinaison peut être également utilisée ambulatoirement au cabinet du médecin traitant. Il est indiqué de ne pas négliger les traitements habituels de physiothérapie et de réhabilitation.

RIASSUNTO E CONCLUSIONI

La soominstrazione endovenosa di idrocloruro di procaina per mezzo del Benadryl si è dimostrata efficace nella cura della trombosi cebrale, degli spasmi, degli emboli e delle stenosi arteriose. Il farmaco può essere usato anche ambulatoriamente. Contemporaneamente si si debbono praticare le cure fisiche e la rieducazione secondo i metodi abituali.

RESUMEN Y CONCLUSIONES

La inyección intravenosa de hidrocloruro de procaina con Benadryl ha resul-

tado ser muy eficaz en el tratamiento de las estenosis, espasmos y trobosis vasculares del cerebro. Este tratamiento puede ser empleado ambulatoriamente. Al mismo tiempo y en laformahabitual deben aplicarse los métodos de fisioterapia y rehabilitación.

RESUMO E CONCLUSOES

Infusões intra-venosas de hidrocloreto de procaina associadas com Benadryl injetável provaram ser valiosamente eficientes no tratamento de tromboses cerebrovasculares, espasmos, embolos ou contraturas. Esta combinação de drogas pode também ser usada em consultório. Fisioterapia e reabilitação dévem ser feitos da maneira usual e se seguir a este tratamento.

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Mortality from "natural" causes is higher during the dark cold months of the year than in the bright warm summer months, being, in general, in inverse proportion to the light and warmth of the environment. On the other hand, the highest death rate from suicide is recorded during the summer months; the lowest, in the winter. It is almost as if the sharp contrast between the smiling summer world and the despairing state of mind of the individual were one of the chief factors in pressing the trigger of the suicide's gun.

In winter there is no contrast between the dismal cold world and a mind equally desolate and beclouded, and this seems to reduce the temptation to put an end to one's own internal tragedies by suicide. In fact, one of the highest suicide rates in the world is recorded for certain South Sea islands where life is gentle and easy-going under turquoise skies. Perhaps because life in a paradise is unchanging from day to day, the only thing left to bring variety in such heavenly monotony is to take the great leap into the Land of Shadows.

Life is of itself a thing of uncertainty and risk. But the dangers and snares of life are preferable to absolute peace and absence of danger, which are attributes of death, for to fear life is to be already halfway dead.

—*Marti-Ibañez*

The Use of Phenazocine in Cerebral Angiographic Study

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ALTHOUGH angiographic study of cerebral vessels has proved its value as a diagnostic tool, the type of anesthesia to be employed in the performance of this procedure remains a problem. General anesthesia certainly makes the procedure painless, and the patient is amnesic. The immobility of the patient permits the procurement of good roentgen pictures. On the other hand, general anesthesia masks unwanted complications, such as hemiparesis or convulsions, that might otherwise alter one's desire to continue the procedure. Ordinary local anesthesia has many proponents, since it permits immediate perception of these complications. The psychic strain on both the patient and the physician is considerable; furthermore, the pain and discomfort may not always be obviated. Even if the pain associated with probing for the artery is eliminated by local anesthesia, the discomfort that arises from rapid injection of the hypertonic radiopaque material may be considerable. Because of these major objections to the use of local anesthesia, various drugs have been employed at one time or another to mitigate these unpleasant complications. Outstanding among the drugs used for this purpose are the narcotic analgesics; and of this group, meperidine (Demerol®) has been utilized more than the others. Although meperidine does provide analgesia and obviates some of the discomfort associated with injection of the radiopaque material, it has certain disadvantages. There is little if any sedative action. There may be an uncomfortable dizziness in some patients. It may cause some degree of arterial hypotension, especially when combined with one of the phenothiazine derivatives administered for sedation. Occasionally, nausea and vomiting may occur. Other narcotics present many of the same disadvantages.

In a previous study of patients in labor,[1] and one of patients undergoing operation with regional forms of anesthesia,[2] a new synthetic narcotic—phenazocine—provided excellent analgesia and sedation in a majority of the patients. It seemed to

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The authors recommend a combination of local anesthesia with the use of phenazocine in the performance of cerebral angiographic investigations, reporting that this technic results in a procedure barely remembered by the patient and free of the usual psychic strain for both patient and surgeon. The results have been especially gratifying when angiograms have been necessary in order to visualize an embolism after treatment.

have a sparing action on the cardiovascular system, and, although it also had a depressant action on the respiratory center, this was apparent only after large doses and was easily reversed or obviated by narcotic anatagonists, such as levallorphan. In contradistinction to other narcotics, phenazocine seemed to possess the ability to prevent or antagonize nausea and vomiting. An amnesic action, such as occurred in obstetric patients, was not demonstrated with consistency in the patients undergoing operations with regional anesthesia and phenozocine, although when present it was welcome. One side action that was more of a nuisance than an actual disadvantage was pruritus of the face, especially around the nose. This was mildly disconcerting to a few patients undergoing surgical treatment under regional anesthesia. Because of its analgesic and sedative qualities, it was our impression that phenazocine might serve as a useful adjunct to local anesthesia in cerebral angiographic investigations.

Technic.—Preoperative medication invariably consisted of the intramuscular administration, one hour before operation, of atropine sulfate, 0.4 mg., combined with meperidine (Demerol®), 50 mg., or promethazine (Phenergan®), 25 mg., or a combination of the three. An intravenous infusion of 5 per cent dextrose in water was started to serve as a vehicle for the phenazocine. An initial dose of 0.5 to 1 mg. of phenazocine was given intravenously, followed by increments of 0.5 to 1 mg. when necessary within the first thirty minutes. It was rarely necessary to administer any more after the first thirty minutes. Local infiltration of the site of percutaneous cannulation was then carried out. An 18-gauge needle was introduced into the common or internal carotid artery. The amount of pain complained of by the patient during cannulation of the carotid sometimes influenced the operating surgeon to inject more of the local anesthetic, or the anesthesiologist to give more phenazocine. By the time the cannula was in place and Hypaque® or Renografin® ready to be injected, maximum sedative and analgesic actions of the phenazocine were in effect.

Angiography and Phenazocine

Patient No.	*Physical Status*	*Age*	*Sex*	*Total Dose, mg.*	*Comment*
1	2	49	F	1	Dilantin intoxication
2	2	32	F	2	*High intracranial pressure. Respiratory depression. Lorfan, 1 mg., and 0_2
3	2	22	F	2	
4	2	53	F	1.5	*Lorfan, 0.5 mg.; papaverine, 100 mg.; deep sleep
5	2	19	F	1.5	
6	3	60	F	4	*Lorfan, 1 mg.
7	1	22	F	1	
8	1	38	F	4	*Lorfan, 0.4 mg.
9	1	46	F	3.5	*Lorfan, 0.3 mg.
10	1	64	M	3.5	*Lorfan, 0.7 mg.
11	2	21	F	4.75	*Lorfan, 0.8 mg.
12	2	60	F	3	*Lorfan, 1 mg.
13	1	14	M	4	
14	3	64	M	1.4	*Lorfan, 0.2 mg.
15	2	26	M	2.2	*Lorfan, 0.2 mg.
16	2	54	F	1.4	*Lorfan, 0.2 mg.
17	3	53	M	1	*Lorfan, 0.4 mg.
18	1	23	M	2	Craniotomy after angiogram
19	1	39	M	3	
20	2	39	M	3	
21	1	55	F	3	
22	2	65	F	1.5	*Lorfan, 0.5 mg.
23	2	32	M	2	
24	2	51	M	2	*Lorfan, 1 mg.
25	2	53	F	2	Patient in coma after 64 cc. Hypaque

*Levallorphan.

Results.—The results are given in the accompanying table. Only 25 well-documented cases have been included, although the drug has been used at other hospitals by one of us (O.S.). A majority of the subjects were adults; the youngest, a boy of 14, was given one of the largest doses in the series (4.0 mg.). The average dose of phenazocine was 2.41 mg. ± 1.09 mg., given within the first thirty minutes. The largest individual dose administered was 4.75 mg. (to a woman aged 21). The smallest dose used was 1 mg.

Only 1 patient in these 25 cases manifested respiratory depression (Case 2), and this patient had elevated intracranial pressure. The depression was easily antagonized by 1 mg. of levallorphan. Because of this possible complication, 14 patients were given levallorphan in conjunction with phenazocine to obviate respiratory depression. In these 14 cases the average dose of levallorphan was 0.59 ± 0.10 mg., and the average dose of phenazocine was 2.55 ± 1.21 mg. This mixture, with a ratio of 1 mg. of levallorphan to 4 or 5 mg. of phenazocine, has worked well clinically. In some of the cases, some form of phenothiazine has been employed to augment the sedative action and possibly the analgesic effects of the narcotic. Investigations are continuing in an attempt to establish some tangible or measurable relation between the phenathazines and phenazocine.

COMMENT AND CONCLUSIONS

One of the most interesting observations in our use of phenazocine has been the lack of strenuous effort to breathe on the part of the well-sedated but conscious patient with marked depression of the respiratory center who is slowly turning cyanotic. This patient may then be commanded to breathe and will do so; he may be ventilated in this manner until an antagonist to the narcotic can be given. Respiratory depression is thus a worrisome but not a serious complication. It is easily remedied by a narcotic antagonist, e.g., levallorphan (N-allylmorphinan), or by artificial respiration. Patients under the influence of phenazocine do not seem to object to being ventilated by means of an anesthesia mask and bag, with the use of oxygen.

Ordinarily, angiographic study with local anesthesia is accompanied by an uncomfortable sensation of heat, which may cause hypotension, nausea, vomiting or even unconsciousness. This does not occur with the use of phenazocine. The blurring of the roentgen picture caused by even slight movement from this discomfort is obviated. The patient can cooperate by assuming the necessary positions required by the roentgen technician. He can also move various parts of his body to demonstrate the absence of complications.

The outstanding tribute to the employment of local anesthesia and phenazocine is the response of patients who have undergone angiographic study with other anesthetic technics. Uniformly, the experience described is of a procedure scarcely remembered and not unpleasant, so that no serious objection to repetition has ever been encountered in our experience. This has been especially gratifying in those cases in which postoperative angiograms have been requested in order to visualize an aneurysm after treatment.

In the limited series here reported, a new narcotic agent—phenazocine—has been useful against discomfort, restlessness and pain during cerebral angiographic studies with local anesthesia.

SUMMARY

General anesthesia frequently masks the occasional complications that may occur during cerebral angiographic procedures, e.g., hemiparesis or convulsions. On the

other hand, local anesthesia employed by itself causes such discomfort and possibly pain in the patient that tremendous psychic strain may be provoked in both the patient and the surgeon. A new narcotic analgesic, phenazocine, given intravenously, obviates the disadvantages of local anesthesia alone by sedating the patient and virtually eliminating both discomfort and pain. The results of its use were observed and tabulated in 25 patients. The average dose of phenazocine was 2.41 mg. ± 1.09 mg., administered within the first thirty minutes. Because of a tendency of phenazocine to depress respiration, a narcotic antagonist, levallorphan, was added to the phenazocine to prevent this complication. A ratio of levallorphan 1 mg. to phenazocine 4 to 5 mg. has worked well for this purpose. The patient remained conscious and cooperative with this technic. The experience was vaguely remembered and not considered unpleasant.

ZUSAMMENFASSUNG

Was am meisten für die Anwendung von Lokalanästhesie und Phenazocin spricht, ist die Reaktion von Patienten, die angiographische Untersuchungen mit anderen Betäubungstechniken durchgemacht haben. Übereinstimmend wird von den Patienten berichtet, dass sie sich des neuen Verfahrens kaum und nicht als einer unangenehmen Erfahrung erinnern. Infolgedessen hatten die Verfasser keine ernsten Schwierigkeiten, die Untersuchung zu wiederholen. Das ist besonders erfreulich in Fällen, wo eine Angiographie nach der Operation gefordert wird, um ein Aneurysma nach der Behandlung zur Darstellung zu bringen.

In der beschränkten Zahl von Fällen, über die hier berichtet wird, hat sich ein neues Narkosemittel, das Phenazocin, als nützlich zur Bekämpfung von Unbehagen, Ruhelosigkeit und Schmerz bei der zerebralen Angiographie unter Lokalanästhesie erwiesen.

RÉSUMÉ

Un hommage éclatant est rendu à l'anesthésie locale à la phénazocine pour l'étude angiographique, comparativement aux autres méthodes. Dans l'ensemble, les expériences décrites sont celles d'une méthode dont l'on se souvient à peine, dont la technique est agréable, de sorte qu'aucune objection sérieuse n'a jamais pu lui être faite par les auteurs. Elle a en particulier donné satisfaction dans les cas ayant exigé des angiographies postopératoires destinées à mettre en évidence un anévrisme après le traitement.

Dans la série limitée des cas présentés ici, un nouvel anesthésique, la phénazosine, s'est révélé efficace contre les sensations de malaise, la nervosité et la douleur provoquees habituellement par les angiographies cérébrales sous anesthésie locale.

RESUMEN

Donde se ve la ventaja de la anestesia local con fenazocina sobre otras técnicas de anestesia es en la obtención de angiografías. El enfermo que ha sido sometido a esta anestesia no gurda de ella el mehor recuerde desagradable y por ello no pone inconvenientes si es precisa una repetición. Esta anestesia es especialmente satisfactoria cuando se practican angiografias postoperatorias tras la extirpación de aneurismas.

En el corto número de casos aquí registrado la fenazocina, un nuevo agente anestésico se ha mostrado como muy útil contra el dolor, inquietud y malestar que puedan producirse al tiempo de las exploraciones angiográficas del cerebro con anestesia local.

SUMARIO

O mais elevado tributo ao emprego metódico de anestesia local e fenazocina é a

resposta dos pacientes que já se submeteram a estudos angioradiográficos com outras técnicas anestesicas. Uniformemente, a experiencia descrita é a de um procésso escássamente lembrado e não desagradável, de modo que os AA. nunca encontram resistencia. Este fato é especialmente grato nos casos nos quais angiogramas pósoperatórios são pedidos para visualisar um aneurisma após o tratamento.

Nas séries limitadas aqui apresentadas, um novo agente narcótico—a fenazocina—tem sido util contra desconforto, desassocêgo e dôr durante os estudos angiográficos com anestesia local.

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All members of the International College of Surgeons who wish to receive copies of the papers that were delivered at the Rome meeting in May, 1960, may do so by requesting the papers of the specialty in which they are interested. The papers are bound in separate volumes according to specialty. The specialties covered are general surgery, neurosurgery, orthopedics, colonic surgery, proctology, ophthalmology, otolaryngology, obstetrics and gynecology, rehabilitation, traumatic surgery, cardiac surgery, pediatrics, urology, plastic surgery, thoracic surgery, anesthesiology and surgical nursing.

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Obstetric and Gynecologic Surgery

The Role of Wheat Germ Oil Concentrate in Prepartum Care

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The authors describe the use of wheat germ oil concentrate as a dietary supplement for pregnant women and report the results obtained in a controlled experimental study. Favorable effects were observed in both prepartum and perinatal phases. The statistical and clinical significance of these results is analyzed.

ANY method that tends to reduce the incidence of toxemia of pregnancy, prematurity and abortion to one-third or one-half their present levels and at the same time increases neonatal vigor and reduce perinatal death must be considered a significant contribution to the field of maternal and infant care. Our statistical observations in two large groups of patients appear to indicate that such a method may be available. Its future value is, in our opinion, worthy of further exploration.

In the past twenty years preventive medicine in the field of obstetrics and gynecology has made large advances. Antibiotics, improved surgical and anesthetic technics, adequate and thoughtful use of blood, technics of early diagnosis of carcinoma and general alertness have greatly reduced both maternal and fetal mortality and morbidity. Formal maternal and perinatal studies are spreading and have increased awareness and application of the advances that have been made. They have also shown that progress can still be made. Lately many reports of studies of dietary supplements and additives have indicated that progress in this direction may further improve the protection of mothers and the salvage of babies. The value of iron, among other minerals, has been fairly well documented. Vitamins, especially C, seem to be important. The value of bioflavinoids and other complex and poorly defined substances is less clear.

This study presents evidence concerning one of the less well defined supplements, wheat germ oil concentrate. Since the

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early 1930s reports have appeared intermittently on the effects of wheat germ oil concentrate on pregnancy and its complications. Unfortunately, much of this work has been ignored or rejected because of a widespread assumption that the effectiveness of wheat germ oil depends on its Vitamin E content. The failure of tocopherols, natural or synthetic, to prove beneficial has cast a cloud on the work done with wheat germ oil. It has been shown on numerous occasions that the effects of wheat germ oil depend in no way upon its Vitamin E content. The presumed synonymity of Vitamin E and wheat germ oil has been so widely accepted that much valid work done with wheat germ oil, both in the field of obstetrics and in that of neuromuscular physiology, has been disregarded.

In 1939 Goetsch and Ritzmann[1] demonstrated that tocopherol is not identical with myotrophic and neurotrophic factors in solvent-extracted wheat germ oil. Milhorat and his associates[2] in 1945 revealed that their successful treatment of dermatomyositis depended not on tocopherol but on an entity found in an ethylene dichloride extract of fresh wheat germ oil. Levin, Silbernagel and Nichols[3] in 1947 showed that reproductive physiologic function in rats was unaffected by tocopherols but was profoundly affected by the same solvent-extracted concentrate used in the work reported here.

The ineffectiveness of Vitamin E has been so well established that any reproduction of this work should be confined to the use of a nonsaponifiable fraction of fresh wheat germ oil extracted by ethylene dichloride or of the crystalline active principle that has now been isolated from wheat germ oil. The commercial preparation used in this study is Denamone, an 8:1 concentrate of wheat germ oil prepared in this manner and containing the active principle to be described. The dosage has been three capsules daily throughout pregnancy.

In 1955 we presented the most recent of a series of papers[4] at the meeting of the International College of Surgeons in São Paulo, Brazil. These showed the effect of this concentrate of wheat germ oil on pregnancy statistics among our private patients as compared with statistical experience in the same practice prior to the use of the concentrate. The figures were assembled from our records of 1,973 consecutive patients whom we treated prior to our prophylactic use of wheat germ oil concentrate, and in Table I these figures are compared with our experience in the treatment of 1,000 consecutive patients who were given wheat germ oil concentrate prophylactically, under the same office supervision and at the same social and economic level.

Startling as these figures are, they have been viewed with some skepticism because the control patients were not treated at the same time as the experimental group. It should be noted, however, that these figures were based upon consecutive and unselected patients of one office practice. It is true that our general prepartum care improved along with that of others in our specialty, but this would hardly explain the wide margin of statistical difference in all the listed categories. Because of these admitted variables, however, which we do not consider as significant as are the differences shown, we decided to conduct a simultaneous control experiment with a random clinic population.

TABLE 1.—*Comparative Statistics*

	Control 1,973 Patients	*WGOC 1,000 Patients*
Threatened abortion	16.6%	9.5%
Abortion	15.0%	3.4%
Prematurity	7.1%	3.1%
Toxemia	10.0%	1.8%
Stillbirth	2.3%	0.5%

Methods and Materials.—This study involved all patients delivered in 1953 and 1954 in the clinical obstetric service of Ohio State University Medical Center. Clinic patients are noted for their poor degree of medical cooperation. Accordingly, it was decided to conduct the experiment for two years, in order to assemble a sufficiently large population to offset, as far as possible, this expected degree of noncooperation. In further compensation for this factor the records of the 4,000 women delivered during this two-year period were carefully screened to exclude all who showed evidence of erratic use of the medicament.

Every patient who presented herself to the Prenatal Clinic was, on her first visit, assigned a number in sequence. Each of those with an odd number was given one of two medicaments; each patient with an even admission number was given the other medicament. Each of the two kinds of capsules and the bottles in which they were dispensed was indentical to the other in appearance; the instruction labels varied only in that an inconspicuous number in the corner of each label was either odd or even. The even-numbered bottles were given to the patients with an even number, and for the odd-numbered patients the odd-numbered bottles were used throughout pregnancy.

The medicaments were bottled, labeled and numbered at the factory. Only the manufacturer knew whether the wheat germ oil concentrate was in the odd-numbered or the even-numbered bottles. The other capsules contained an inert placebo. Not until the experiment was concluded, all patients' charts reviewed, and the data put on IBM cards did we know which capsules contained the wheat germ oil concentrate and which the placebo. None of the clinic personnel—nurses, medical student clerks, interns, residents or staff physicians—knew the identity of the medicaments. They were dispensed at the clinic rather than through the pharmacy, for technical reasons. The patients were aware neither that they were participating in an experiment nor that they were being treated with anything other than routine prenatal medication. The medicaments were dispensed by the student clerk who examined the patient, and each bottle contained just enough capsules to last four weeks at the rate of three capsules nightly.

Revisits were scheduled at four-week, two-week, or one-week intervals, so that a patient need not run out of the medicament between visits. In addition, at each visit a note was made on the chart as to the probable faithfulness of consumption. This information and the degree of faithfulness of clinic revisits formed the basis for inclusion or exclusion of a patient in the final statistics.

Approximately 4,000 mothers' charts and a like number of babies' charts were all finally reviewed by one of us (J. B. P.) alone, for the sake of consistency in interpretation. The data were assembled on code cards and later transferred to IBM cards. Discarded records included those of all patients who had been under medication for less than six weeks, those who had missed one or more clinic visits, those whose charts contained evidence of unfaithfulness in medication, and those whose charts did not specifically state that the medicament had originally been dispensed and faithfully refilled. This screening greatly reduced the number of usable patients, and incomplete data on corresponding but separate babies' charts further reduced the total. The students', interns' and nurses' notes were checked to verify or amplify the complication diagnosis or status of baby or mother. The final figures were assembled from 637 patients treated with wheat germ oil concentrate and 710 controls.

In spite of every precaution in the

screening of a large series of records there is no positive assurance that all of the patients included took their medication consistently, and any inconsistency would be reflected in a narrowing of the statistical differential. A sufficiently large number of cases has been accumulated to justify expectation of a high degree of statistical and Clinical validity.

It will be noted (Table 2) that there is no mention of abortion. Clinic patients usually present themselves for the initial visit at such a stage of gestation (beyond the third month) that they have largely passed the abortion stage.

These figures indicate a very low incidence of complications for a clinic population, but it must be remembered that the study excluded all erratic visitors and all who were suspected of indifferent cooperation. The remainder comprises a group of patients receiving optimal prepartum care. The figures presented are therefore more favorable than those on the entire group of 4,000 delivered during this period, reflecting the value of adequate care in advance of delivery.

TABLE 2.—*Comparative Results*

	WGOC 637	*Controls 710*	*p Values*
Pre-eclampsia—			
mild	39—6.1%	62— 8.7%	0.044*
moderate & severe	14—2.2%	32— 4.5%	0.015*
Total	53—8.3%	94—13.2%	0.003*
Eclampsia	1	1	
Postpartum bleeding, 500 cc. or more	10—1.5%	16— 2.2%	0.239
Duration of labor			
1st stage, 20 hrs. or more	45—6.7%	53— 7.4%	0.345
2d stage, 100 min. or more	35—5.5%	41— 5.8%	0.460
Gestation under 38 weeks	36—5.7%	65— 9.2%	0.010*

*Statistically significant.

The charts of the babies born to the aforementioned mothers were also reviewed. Table 3 shows wheat germ oil concentrate given to pregnant women appears to exert an effect on their babies.

COMMENT

As has been stated, it has been six or seven years since these patients were delivered. Only part of this delay in reporting was caused by the fact that all 8,000 charts were reviewed by one author. It appeared to us from the figures presented that wheat germ oil concentrate given to pregnant women had prophylactic value. This tends to confirm the figures previously reported by us for our private patients. The reason for these effects was not clear, nor were we able to conclude whether the effects were due to a single substance in wheat germ oil or whether numerous factors were involved. Knowing that work was in progress in an effort to answer these questions, we decided to withhold publication until some rationale for the results we had observed could be presented.

The work has not been published as yet, and was known but not reportable at the time this paper was originally presented, but a crystalline substance has been isolated from wheat germ oil that has reproduced some of the effects of wheat germ oil concentrate in other fields.[5] This compound is a 28 carbon, straight chain alcohol, octacosanol, isolated from wheat germ oil. The synthesized compound gave results biologically identical with those of the isolated compound. The details will be published by Ezra Levin and his associates, who are credited with the discovery. The department of Animal Nutrition of the University of Illinois[6] showed that the biologic activity of octacosanol is identical with that of wheat germ oil concentrate and that both have a pronounced effect on the oxygen uptake of body tissues. Inde-

pendent work done on man[7] and on rats[8] indicates that wheat germ oil concentrate increases the glycogen content of the endometrium, the liver and other organs. Other investigations by Cureton of the University of Illinois[9] in four experiments with college boys each year for four years, with U.S. Navy frogmen at Key West, Florida, and with Navy underwater demolition trainees at Little Creek, Virginia, all show that the crystalline derivative produces the same increased physical endurance and efficiency demonstrated for wheat germ oil concentrate.

Octacosanol is found in the germ of wheat and other cereal grains. It is removed from them by modern milling technics. It is present to a less extent in green leafy vegetables but is an item in which the modern diet is deficient. All of its physiologic effects have not been clearly demonstrated, but it is fairly clear that in optimal amounts it improves the ability of body tissues to utilize oxygen and to store glycogen. Thus one has a rationale for the value of wheat germ oil concentrate as a supplement to the diet of pregnant women. The absence of any relation between this substance and Vitamin E is also quite clear.

While all of the percentages shown in Tables 2 and 3 favor the medicated group over the controls, a statistical analysis shows that significance under a one-sided test at the 5 per cent level of significance gives validity only to the incidence of toxemia, the duration of gestation, respiration and cry, and failure of resuscitation. All of these, however, are key factors in evaluating the adequacy of prepartum management. Loss or gain from birth weight approached statistical significance at 9 per cent and 8.5 per cent respectively. It appears reasonable that, since all percentages favored wheat germ oil concentrate, larger groups or greater faithfulness in medication might well result in a wider range of statistical significance.

TABLE 3.—Effect on Infants

	WGOC 637	*Controls 710*	*p Values*
Birth weight 2,500 Gm.	41— 6.4%	55— 7.7%	0.200
Respiration and Cry			
Immediate	430—67.5%	441—62.1%	0.022**
Delayed	145—22.7%	194—27.3%	0.031**
Resuscitation			
Successful	56— 8.8%	64— 9.0%	0.480
Unsuccessful	0— 0.0%	5— 0.7%	0.047**
Macerated stillbirth	1	1	
Nonmacerated	1	2	
Under birth weight at discharge*	486—76.4%	565—80.0%	0.090
Over birth weight at discharge	108—16.9%	99—14.1%	0.085

*Usual age at discharge was 3 days.
**Statistically significant.

An apparent inconsistency will be noted in the fact that the compared durations of the first and second stages of labor showed the least degree of statistical significance, although there was a percentile difference in favor of the medicated group. In view of the evidence that wheat germ oil concentrate increases the oxygen uptake of tissue cells, as well as physical efficiency, one may expect a shortening of the period of labor in the medicated group. We cannot explain this lack of the predictable differential. The presence of numerous other factors involved in the length of labor, however, indicates a need for the study of still larger groups to demonstrate conclusive evidence of the effect of this substance upon labor. We are convinced that the evidence presented is sufficiently strong to warrant further controlled experiments with this substance by other investigators.

SUMMARY

Areas of advance in prenatal care and possible further areas for investigation are reviewed.

The history of wheat germ oil concentrate as a dietary supplement is reviewed and the dichotomy of Vitamin E and wheat germ oil concentrate emphasized.

The results previously reported by the authors on the effect of wheat germ oil concentrate on the complications of pregnancy are mentioned.

A controlled experiment, in which this substance was used in a large clinic population, is described, and the favorable effects on maternal and preinatal behavior are noted.

The statistical and clinical significance of these figures is discussed.

The isolation of a crystalline substance from wheat germ oil is mentioned, and its biologic activity has been advanced as a possible explanation of the effects described by the author.

ZUSAMMENFASSUNG

Die Verfasser geben einen Überblick über die Fortschritte auf dem Gebiete der Schwangerenfürsorge und über die Probleme, die Möglichkeiten weiterer Forschung in sich schliessen.

Die Geschichte des konzentrierten Weizenkeimöles als Nahrungszusatz wird besprochen und die Zweiteilung des Vitamins E und des konzentrierten Weizenkeimöls hervorgehoben.

Die von den Verfassern früher veröffentlichten Arbeiten über die Wirkung des konzentrierten Weizenkeimöles auf Schwangerschaftskomplikationen werden erwähnt.

Die Verfasser berichten über ein mit Kontrollversuchen vorgenommenes Experiment, wobei das konzentrierte Öl an einem grossen klinischen Material zur Anwendung gelangte und günstige Einflüsse auf die Mutter und ihr Verhalten während der Schwangerschaft zeigte.

Die statistische und klinische Bedeutung der von den Verfassern angeführten Zahlen wird erörtert.

Die Verfasser erwähnen ferner die Isolierung einer kristallischen Substanz aus dem Weizenkeimöl und ziehen deren biologische Aktivität als mögliche Erklärung der von ihnen beschriebenen Effekte heran.

RÉSUMÉ

Certains domaines des progrès de la thérapeutique prénatale ainsi que les progrès encore à réaliser sont étudiés.

Les auteurs exposent l'historique du concentré d'huile de germes de blé comme complément diététique, insistant sur dichotomie de la vitamine E et du concentré d'huile de germes de blé.

Les résultats antérieurs des auteurs sur l'action du concentré d'huile de germes de blé sur les complications de la grossesse sont rappelés.

Les auteurs décrivent une expérience clinique étendue et contrôlée au moyen de cette substance, énumérant ses divers effets favorables.

L'importance statistique et clinique des chiffres mentionnés est discutée.

L'isolation d'une substance cristalline de l'huile de germes de blé est signalée, et son activité biologique a été avancée comme une explication possible des effets décrits par les auteurs.

RESUMEN

Se hace una revisión de los últimos avances experimentales y clínicos en los cuidados del embarazo, recordando el uso de concentrados de aceite de grano de trigo como complemento dietético de la mujer en estado, así com la asociación de éstos con la vitamina E, y subrayando los

buenos resultados que han obtenido otros autores en la profilaxis de las complicaciones de la gestación con estos concentrados.

En este artículo se describe un trabajo experimental con esta substancia en el que han participado muchas gestantes y en el que se han obtenido buenos resultados, que ofrecen interés tanto clínico como estadístico.

Se señala que se ha obtenido del grano de trigo una substancia cristalina cuya actividad biológica parece explicar tan buenos resultados.

SUMARIO

São revistos os progressos em cuidados pré-natais e sugeridas possíveis investigações futuras.

Fazem revisão da historia do oleo concentrado de germe trigo como suplemento dietético e a dicotomia da vitamina E e o mesmo. Mencionam os resultados já relatados pelos AA. sobre o efeito do oleo concentrado de germe de trigo, nas complicações da gestação. Descrevem uma experiencia controlada, na qual esta substancia foi usada em uma extensa população clinica e os efeitos favoráveis no compartamento materno e pré-natal. Discutem a significação estatistica e clinica desses quadros.

Relatam o isolamento de uma substancia cristalina do oleo de germe de trigo e sua atividade biológica, sugerida como possível explicação dos efeitos descritos pelos AA.

Resumem as diferentes linhas de tratamento cirurgico da ascite cirrógena. A multiplicidade desta indica não haver operação padrão.

Os AA. descrevem uma nova técnica cirurgica- pleuroperitoneostomia, pela qual o fluido ascitico é drenado para a cavidade pleural direita através de fenestração do diafragma, com o propósito de provocar a absorção do fluido e redusir as recurrencias. Os resultados no conjunto são encorajadores.

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Treatment of Disinsertion of the Biceps Brachii

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DISINSERTION or rupture of the inserting tendon of the biceps brachii is believed to occur more often than the literature indicates. Disinsertion of this muscle is an uncommon lesion when compared to ruptures of the long head and short head of the biceps brachii. In reviewing the literature, one comes to the conclusion that approximately 3 per cent of all ruptures of the entire biceps brachii take place at its point of insertion. Acquaviva, in 1898, was one of the first to report a rupture of the distal end of the biceps brachii muscle. Dobbie, in 1941, first reported a sizable series of cases of this lesion. His report included 51 cases. In 1 of these he had treated the patient himself; the remaining 50 were cases he had collected by circularizing approximately 500 physicians throughout the United States. Since 1941 a few other articles have appeared in the American literature, most of which report 1 or more cases and deal principally with the method by which the author treated his own patient or patients.

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The history of ruptures of the insertion of the biceps brachii muscle is reviewed, and the anatomy and function of the biceps brachii muscle are described. The concept that degeneration of a tendon is a prerequisite, in most cases, to its actual rupture when sudden extension of the fixed, flexed elbow is required, as in lifting a heavy load, appears to be correct. A statistical analysis of 13 cases observed over fourteen years is presented.

Anatomic and Functional Background.—The biceps brachii is a long fusiform muscle placed in front of the anterior aspect of the upper part of the arm, arising by two heads and inserted by one tendon. The short head arises from the coracoid process; the long head arises from the supraglenoid tuberosity at the upper margin of the glenoid cavity and is continuous with the glenoid labrum. As the tendon of the muscle approaches the radius it is twisted upon itself, so that its anterior surface becomes lateral and is applied to the tuberosity of the radius at its insertion. Opposite the bend of the elbow the tendon gives off, from its medial aspect, a broad aponeurosis. The lacertus fibrosus, also known as the bicipital fascia, passes obliquely downward and medially across the brachial artery and is continuous with the deep fascia covering the points of origin of the flexor muscles in the forearm.

The biceps brachii is supplied by the musculocutaneous nerve. It is a flexor of

the elbow, to a lesser extent, of the shoulder. It is also a powerful supinator and serves to render tense the deep fascia of the forearm by means of the lacertus fibrosus given off from its tendon. When the forearm is fixed, the biceps brachii and brachialis flex the arm upon the forearm, as in climbing.

Pathologic Picture.—It is unanimously agreed that rupture of this particular tendon is usually the result of violent muscular contraction superimposed upon preexisting degenerative changes in the tendon structure. In Chevalier's opinion, this particular tendon first tears partially as a result of preexisting pathologic changes, after which the rupture is completed by the contracture of the muscle. Davis and Yassine reported 2 cases in which degenerative changes were present in the tendon and ganglion-like formations had appeared. They also observed hypertrophic lipping along the anterior margins of the area of the radial tuberosity. They reported a tear that developed in the tendon of 1 of their patients, resulting from friction along the anterior margin. They expressed the opinion that in their cases the knifelike margin of the radial tuberosity was the basic cause, producing erosion of the biceps tendon. Also, a good many authors report that the avulsion site of the tendon is usually frayed. MacMaster, reporting experiments on young healthy rabbits, stated that a normal tendon does not rupture. Experimentally, he noted that the muscle would rupture or the tendinous attachment would part.

Etiologic Factors.—With regard to the trauma that immediately precipitates or causes this injury, the patient generally has a history of lifting with the affected elbow in 80 to 90 degrees of flexion. It is possible also to sever the tendon by means of direct blunt blows in the antecubital area when the elbow is flexed.

Occupational Factors.—This type of lesion generally occurs in men over the age of 40. Although it occurs most often in those accustomed to doing moderate or heavy lifting, it is not uncommon in persons who do only occasional lifting.

Symptoms and Signs.—As to the symptoms, the patient generally complains of sudden pain in the affected elbow, which may or may not radiate up the arm to the shoulder. This pain is noticed when lifting is done with the affected elbow in flexion. The weight lifted need not be very heavy. Shortly thereafter, the acute pain decreases but a dull pain persists. A bulge occurs in the anteromedial area of the upper part of the arm; this is due to retraction of the muscle. A movable subcutaneous "nodule," representing the disinserted tendon, is almost always present. Swelling and discoloration, particularly in the antecubital space, are generally present. The patient's ability to flex the elbow decreases but does not completely disappear, as the brachialis and brachioradialis muscles, which also take part in flexion of the elbow, remain intact. The patient's ability to supinate the forearm is reduced.

Treatment.—It is universally agreed that, since the biceps brachii muscle is one of the important flexors of the elbow, surgical repair of the severed tendon is the treatment of choice; the method of reattaching the severed tendon or the location of the reattachment, however, is not unanimously agreed upon. The very fact that so many operative technics have been suggested for the repair of this lesion indicates the diversity of opinion as to the ideal method of repair. Burnham roughens the radial tubercle with a rasp, drills two small holes in a V-shaped pattern through the base of the tubercle from either side and then threads these two holes with double sutures of No. 8 white cotton. One end of the cotton is threaded zigzag up and down through the tendon,

and the tendon is then pulled down taut to the bone and the suture tied. Lee deepens the notch in the tendon after a double suture of silk has been introduced into the end of the tendon and then ties the two sections of tendon around the upper end of the radius. Wagner makes a "key slot" in the bicipital tubercle, obtains a strip of fascia lata 1 inch (2.5 cm.) wide and 7 to 8 inches (17.5 to 20 cm.) long from the thigh, ties a knot near the midpoint of the fascia lata and then secures the knot with several cotton sutures. The bulbous end of the fascia lata graft is forced into the hole of the key slot and the neck pulled up into the proximal portion of the slot. The distal end of the biceps is then freshened, and the fascia lata is threaded through the distal end of the tendon about 1½ inches (3.7 cm.) proximal to the end. The biceps is then pulled to the bicipital groove and appropriate sutures applied. Michele and Krueger report the use of the "trap door" and key-slot method in the repair of this lesion. Fischer and Shepanek split the tendinous insertion into halves and then suture one end of the divided tendon to the other after passing one of the ends through the drill holes. Bunnell has reported the use of the pull-out wire method. Many surgeons have sutured the tendon of the biceps to that of the brachialis anticus near its point of insertion into the ulna. If a portion of the inserting tendon has been left intact at its point of insertion, end-to-end or side-to-side, suturing has also been done. These are but a few of the many methods devised for suture or repair of this type of lesion. Satisfactory results are reported in all cases.

Statistical Analysis of 13 Cases.—The remarks which follow represent the experiences of the author in the management of this type of lesion.

From July, 1945, through September, 1959, I had the privilege of seeing thirteen cases in which I made a diagnosis of severed insertion of the biceps brachii muscle. A statistical analysis of these cases follows.

TABLE 1.—*Sex Incidence*

Male patients	13
Female patients	0

TABLE 2.—*Age Incidence*

Youngest patient	36 yrs.
Oldest patient	58 yrs.
Average age	47.8 yrs.

TABLE 3.—*Arm Involved*

Right arm	9
Left arm	4

Sex Incidence.—All of the patients in the series were male. It is interesting to note that in a review of the literature I discovered no reference to the occurrence of this lesion in women.

Age Incidence.—These lesions occur mostly during the fifth decade of life, but may also occur earlier or later. My youngest patient was 36 years old and my oldest 58, an average age of 47.8 years.

Arm Involved.—The right arm was involved in 9 cases and the left in 4. All of the patients were right-handed.

Etiologic Factors.—In all cases a sudden force had been exerted on the flexed, fixed elbow. One patient slipped on a catwalk and, in order to prevent himself from falling, hung from one arm, so sustaining the injury. In another patient the tendon was ruptured when he tried to catch a heavy falling object. One man caught his left arm in the steering wheel of his car in an accident, with the result that the left arm was pulled forcibly by the revolving wheel. One man contracted the injury while throwing a bowling ball. In the remaining 9 patients injury occurred on lifting

heavy objects with the elbow flexed and supinated.

Symptoms and Signs.—The symptoms and signs are rather uniform and fixed. Practically all patients reported immediate pain in the elbow, followed by swelling, discoloration and a bunched-up biceps. On examination one could also note a rolled-up movable "ball" on the lower front aspect of the upper arm. In each case the patient had a minimal limitation of either supination or flexion, or both, or showed weakened but full-degree supination and flexion.

Time of Operation.—Two of my patients underwent operation on the same day the injury took place. Six were operated on a day after the injury, 1 three days later, 1 four days after and 2 six days later. One refused operation entirely.

Type of Operation.—End-to-end repair of the severed tendon was done in 2 cases.

In 6 cases the severed tendon was sutured into the insertion of the brachialis muscle.

In 2 cases, a window was cut into the tuberosity of the radius and the disinserted tendon fixed inside the window by a Bunnell pull-out wire. In 2 other cases the tuberosity was roughened and the disinserted tendon fixed by the conventional pull-out wire method.

One patient refused operation.

Of the operations performed in this particular group of cases, the one in which the disinserted tendon was sutured into the point of insertion of the brachialis muscle was definitely the easiest to perform from the technical and anatomic points of view. It is conceded that methods reported in the literature, including the "keyslot" hole, the fascia lata repair, the Bunnell method, the end-to-end suturing method, the looping of the split tendon around the neck of the radius, etc., all give excellent results. It is my opinion, however, that often any or all of these methods are technically difficult to perform. The method of repair which, in my hands, has proved simplest to perform and yet has given highly satisfactory results is that one in which the disinserted or severed tendon is sutured into the point of insertion of the brachialis muscle. It is important to excise all frayed or bulbous tissue from the severed tendon prior to reinsertion.

TABLE 4.—*Cause of Injury*

Slipping on catwalk and hanging from arm	1
Trying to catch heavy falling object	1
Catching arm in steering wheel in motor accident	1
Throwing a bowling ball	1
Lifting with elbow flexed	9

TABLE 5.—*Symptoms and Signs All Cases*

Immediate pain
Swelling
Discoloration
Bunched biceps
Rolled "ball" in front of arm
Decreased or weak supination
Decreased or weak flexion of elbow

TABLE 6.—*Time Lapse Between Injury and Operation*

1 Day after injury	6 cases
3 Days after injury	1 case
4 Days after injury	1 case
6 Days after injury	2 cases
0 Days after injury	2 cases
Refused operation	1 case

TABLE 7.—*Type of Operation*

End-to-end repair	2 cases
Bone window with Bunnell pull-out wire	2 cases
Simple Bunnell pull-out wire	2 cases
Sutured to brachialis insertion	6 cases
No operation	1 case

TABLE 8.—*Results Obtained*

All operative cases	Excellent
Nonoperative case	Poor

Postoperative Immobilization.—The type of postoperative immobilization employed in each case was application of a plaster cast extending from the proximal palmar fold to the axilla, with the wrist in a cocked-up position, the forearm in complete supination and the elbow at a right angle. This type of immobilization was maintained for three weeks, after which exercises and the whirlpool bath were employed.

Results Obtained.—An excellent functional result was obtained in all operative cases. The type of repair done had no bearing upon the result obtained. In all cases complete restoration of full supination and flexion of the elbow was obtained, with good power. The patient in the nonoperative case had a slight limitation of flexion and supination in the affected arm, together with weakness of these motions. All patients returned to their former work.

CONCLUSIONS

1. Disinsertion of the biceps brachii is an injury that occurs exclusively in the male. The lesion is more common than is generally assumed.

2. In most cases this injury occurs during the fourth and fifth decades of life, as a result of violent straining force applied to the flexed, supinated elbow, usually in the act of lifting.

3. Many types of repair of this lesion have been reported.

4. Excellent results are obtained regardless of the method of surgical repair.

5. The simplest method of repair, from the technical standpoint, is suture of the severed or disinserted tendon into the point of insertion of the biceps brachii muscle.

6. In 1 case, in which the patient refused surgical repair, the only unsatisfactory result in the entire series was obtained. This provides further evidence of the necessity of surgical repair of these lesions.

ZUSAMMENFASSUNG

Es wird ein Überblick über die Geschichte von Muskelrissen des Bizepsansatzes gegeben, und die Anatomie und Funktion des grossen Armmuskels werden beschrieben. Offenbar besteht die Auffassung zu Recht, dass in den meisten Fällen, wo wie beim Heben eines schweren Gewichts plötzliche Streckung des fixierten gebeugten Ellbogens erfolgt, dem eigentlichen Riss eine Entartung der Sehne vorangegangen sein muss. Der Verfasser gibt eine statistische Analyse von 13 Fällen, die er innerhalb von 14 Jahren beobachtet hat.

RÉSUMÉ

L'auteur passe en revue l'historique des ruptures de l'insertion du biceps du bras, et décrit l'anatomie et la fonction de ce muscle. L'hypothèse selon laquelle la dégénérescence d'un tendon est une condition préalable à sa rupture dans la plupart des cas lors d'une extension soudaine du coude fixé, fléchi (tel que le soulèvement d'une charge lourdel, semble correcte. Une étude statistique de 13 cas observés en 14 ans est présentée.

RIASSUNTO

Dopo alcune notizie storiche sulla rottura della inserzione del muscolo bicipite brachiale, viene trattata l'anatomia e la funzione di questo muscolo. Sembra giusto pensare che sia indispensabile, nella maggior parte dei casi, un processo degenerativo a carico del tendine perchè si verifichi la rottura quando il gomito, fisso e flesso, si raddrizza bruscamente come nel sollevare un peso. Viene presentato lo studio

statistico di 13 di questi casi, osservati in un periodo di 14 anni.

RESUMEN

En este trabajo el autor pasa revista a la historia de las rupturas de la inserción del músculo biceps así como a la anatomía y a la función de este músculo. Paraece correcta la hipótesis de una degeneración del tendon como condición fundamental para la ruptura en los casos de una extensión súbita de un codo que estaba fijo en flexión como ocurre a veces al levantar un peso grande. Se completa el trabajo con un análisis de trece casos observados a lo largo de catorce años.

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When the working-women in the poor districts come to the doors of the public-houses and try to get their husbands home, simple minded "social workers" imagine that every husband is a tragic drunkard and every wife a broken-hearted saint. It never occurs to them that the poor woman is only doing under coarser conventions exactly what every fashionable hostess does when she tries to get the men from arguing over their cigars to come and gossip over the teacups.

—*Chesterton*

Some Ophthalmic Complications of Nasal Origin

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SEPTIC FOCI in the nasophrynx and the paranasal sinuses have been blamed for many ocular diseases, such as optic neuritis and uveitis, since time immemorial. In many instances a conclusive proof of these associations is lacking, and with regard to the influence of focal infection on the eyes Reiman and Havens (1940) wrote that a large group of patients whose tonsils had been removed continued to suffer from the original disease for which tonsillectomy was performed. During the past three years the 36 patients with ocular complications conclusively resulting from a nasal disorder observed by us in Irwin Hospital, were of two varieties:

Group I: Patients Referred by the Otolaryngologist.—This group was composed primarily of patients with such nasal disease in whom obstruction in breathing, rhinorrhea, expistaxis or facial deformity had developed. There were 28 in this group, and one or more of the following ocular complications were noted: ocular displacement (24 cases); restricted ocular movements (21 cases); ptosis (3 cases); blockage of the lacrimal passage, giving rise to excessive lacrimation (13 cases), and changes in the fundus due to pressure on the optic nerve or the retinal vessels (6 cases). In 1 case there was complete destruction of all the orbital contents (Case 4, Fig. 1*D*).

The nature of the 28 cases seen in this group and the ocular complications resulting therefrom are summarized in the accompanying table.

A few examples of the cases included in the table are here described.

CASE 1.—The condition of a man aged 39 was diagnosed as left-sided nasopharyngeal fibroma. Proptosis and ptosis were present on the left side, and the ocular movements were restricted. An obvious facial disfigurement, due to a visible hard prominence near the left inner canthus (Fig. 1*A*), was responsible for an obstruction of the left nasolacrimal passage.

From the Department of Ophthalmology, Irwin Hospital, New Delhi.
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Ophthalmic complications caused by septic foci in the nasopharynx and the paranasal sinuses occur frequently enough to merit attention. The complications include ocular displacement, restriction of ocular movement, ptosis, blockage of lacrimal channels and pressure changes in the ocular fundus. Data on 28 cases are tabulated, and 10 cases are reported in detail.

Complications Observed in Patients Referred by the Otolaryngologist

No. of Cases	Nature of Nasal Disease	Age (Years)		Ocular Complications	
		Male Patients	Female Patients		
9	Nasopharyngeal fibroma	16, 33, 39 (Fig. 1*A*), 56, 60, 62	45, 52	1. Ocular displacement 2. Restricted movements 3. Obstructed naso-lacrimal passages 4. Fundus changes 5. Ptosis	8 7 4 1 1
14	Carcinoma of nose and/or antrum	5,* 19 (Fig. 1*B*), 57, 60 (Fig. 1*C*), 61, 65	40 (Fig. 1*D*), 42, 50 (Fig. 1*E*), 55, 55, 62, 62, 65	1. Ocular displacement 2. Restricted movements 3. Obstructed naso-lacrimal passages 4. Fundus changes 5. Orbital destruction 6. Ptosis	11 9 7 3 1 1
5	Osteomyelitis of maxilla	14, 21 (Fig. 2*A*), 24	16, 18	1. Ocular displacement 2. Restricted movements 3. Obstructed naso-lacrimal passages 4. Fundus changes 5. Ptosis	5 5 2 1 1

*Anaplastic carcinoma leading to death.

CASE 2.—A boy aged 19 had an epidermoid carcinoma in the left nostril. There was proptosis on the left side, but no other ocular complications were present. Secondary growths had developed in the right clavicle and both the knee joints (Fig. 1*B*).

CASE 3.—A man aged 60 showed involvement of the left lacrimal sac by direct invasion of a carcinoma in the left nostril. When seen in the Department of Ophthalmology he had no proptosis, restriction of ocular motility or any other ophthalmic complication (Fig. 1*C*). High voltage roentgen therapy was recommended.

CASE 4.—A woman 40 years old had a growth at the upper inner angle of the right orbit. Biopsy revealed carcinoma arising from the right frontal sinus. Irradiation was advised but was refused. After four months, however, the patient returned, with the appearance shown in Figure 1*D*.

CASE 5.—A woman 50 years of age had carcinoma of the right maxillary antrum. The right eye was proptosed, being displaced upward and outward, and ocular movements were completely absent. There was ptosis on the right side. The right lacrimal passage was obstructed, and the fundus showed congestion and edema (Fig. 1*E*).

CASE 6.—A man aged 21 had osteomyelitis of the right maxilla, with a discharging sinus of several months' duration near the outer canthus of the right eye and multiple discharging sinuses in the palate. Trismus was present. The right eye showed slight proptosis, a partially closed palpebral aperture simulating ptosis (which was mechanical, resulting from excessive fibrous tissue) and restriction of all ocular movements. Infraduction was completely absent (Fig. 2*A*).

Group II: Patients Who Came Directly to the Department of Ophthalmology.—These patients were the ones who were unable to recognize the origin of their symptoms and consulted the ophthalmologist because of gradually progressive and painless proptosis or a discharging sinus in the close vicinity of the eye. There were 8 cases in this group, of which after the necessary investigations, 1 proved to have proptosis associated with sinusitis (Fig. 2*B*) and the lesions of 7 were conclusively diagnosed as frontal and/or ethmoidal mucoceles.

CASE 7.—A man aged 28 complained of prominence of the right eye associated with headache. Although all the laboratory data were normal, the total leukocyte count was

13,800 per cubic millimeter of blood. A skiagram in Water's position showed pansinusitis on the right side. Treated with antibiotics, the patient recovered completely in three weeks (Fig. 2*B*).

CASE 8.—A man aged 27 had had slowly progressive and painless proptosis on the left side for eighteen months. The left eyeball was displaced forward, downward and outward (Fig. 2*C*). He was otherwise asymptomatic, and vision was normal, as was the fundus. The ocular movements were somewhat restricted in all directions. In the upper nasal quadrant of the left orbit a hard, bony, immobile mass was palpable. A skiagram showed a bony pocket connected with the left frontal sinus, and pansinusitis was reported. On exploratory puncture the viscid grey fluid, sucked out with difficulty, proved sterile on culture.

Operation was performed with the patient under general anaesthesia. An incision, bone deep, was made along the left supraorbital margin and the upper half of the medial margin of the left orbit. On elevation of the periosteum under the roof the friable bony plate cracked, and a thick, grey, gelatinous substance appeared at the site. This was sucked out, and, by exploration of the cavity with a gloved finger, continuity with the left frontal and ethmoidal sinuses was established. At this stage Dr. I. S. Gupta, Honorary Otolaryngologist, Irwin Hospital, (by invitation) freely exenterated the frontal and the ethmoidal cells. The nasal opening was enlarged; a drainage tube was inserted through the left nostril, and the wound was sutured. Postoperative antibiotics were administered, and an uneventful recovery took place in ten days. Four weeks later the proptosis had decreased by 9 mm. and the general appearance of the patient was much improved (Fig. 2*D*).

CASE 9.—A woman aged 62 (Fig. 2*E*) had a chronic discharging sinus below the upper orbital margin of the right eye. When probed, it was observed to be continuous with the frontal sinus. A skiagram showed pansinusitis. Surgical treatment was given in exactly the same style as in Case 8; in addition, a tarsorrhaphy was performed. In ten days an uneventful recovery took place. Four weeks later the eyelids were released. Followed up for three months, the patient was in entirely satisfactory condition (Fig. 2*F*).

CASE 10.—A woman, 55 years of age, presented an exactly similar picture to that of the patient in Case 9. She was treated simi-

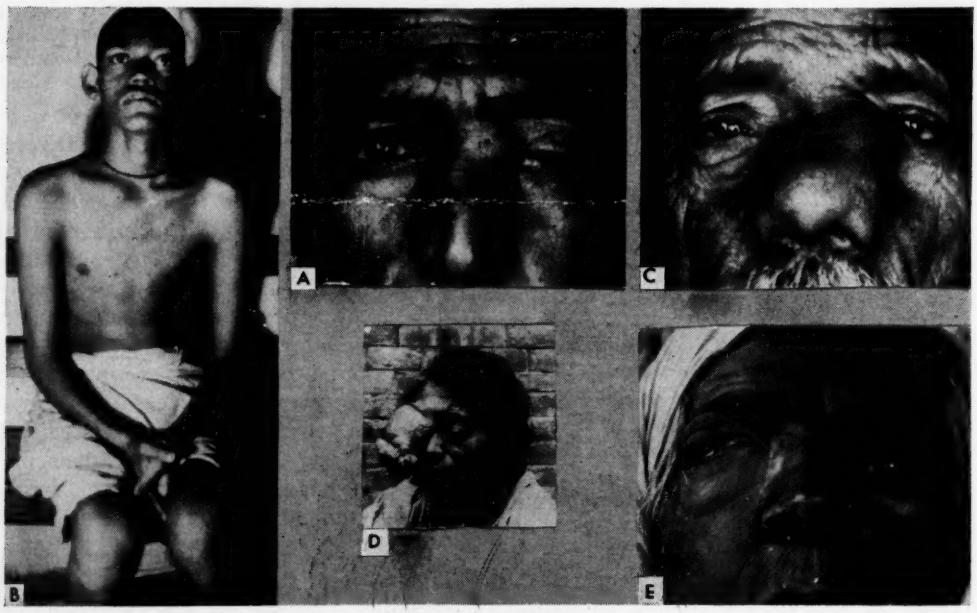

Fig. 1.—See text.

larly, except that no tarsorrhaphy was performed. Discharged in two weeks, after normal recovery in twelve days, the patient returned with a severe sloughing hypopyon ulcer of the right cornea. Adhesions of the skin had formed at the site of the operation; lagophthalmos and exposure keratitis were present. Despite all efforts the right eye could not be saved (Fig. 2*G*).

COMMENT

Strictly speaking, all the cases included in the series fell into the therapeutic sphere of the otolaryngologist and/or the roentgenologist.

The simplicity of surgical treatment of proptosis due to mucoceles is obvious from Cases 9 and 10, in which the lesions could be handled independently by the ophthalmologists.

The omission of tarsorrhaphy in Case 10, leading to the loss of the eye, was a serious, though avoidable, mistake.

Author's Note: Our thanks are due to Dr. I. S. Gupta, F.A.C.S., Honorary Otolaryngologist, Irwin Hospital, for all the help that enabled us to record our experiences in this paper.

Fig. 2.—See text.

ZUSAMMENFASSUNG

Durch septische Herde im Nasenrachenraum oder in den Nasennebenhöhlen hervorgerufene Augenkomplikationen kommen häufig genug vor, um es gerechtfertigt erscheinen zu lassen, sie der Aufmerksamkeit des Arztes zu empfehlen. Zu den Komplikationen gehören Verlagerung des Auges, Einschränkung der Augenbewegung, Ptose, Blockierung der Tränenkanäle und Druckveränderungen im Augenhintergrund. Die Befunde in 28 Fällen werden tabellarisch dargestellt, und über 10 Fälle wird im einzelnen berichtet.

RÉSUMÉ

Les complications ophtalmologiques causées par des foyers septiques du rhinopharynx et des sinus maxillaires sont assez fréquentes pour retenir l'attention. Ces complications comprennent les déplacements oculaires, la limitation des mouvements oculaires, la ptose, le blocage des canaux lacrimaux et des modifications de pression du fond de l'oeil. Les données de 28 cas sont classifiées et 10 cas sont rapportés en détail.

RIASSUNTO

Le complicazioni oculari da foci settici del nasofaringe e dei seni paranasali sono abbastanza frequenti da meritare atten-

zione. Tali complicazioni comprendono spostamenti dell'occhio, limitazione dei movimenti, ptosi, blocco dei condotti lacrimali, modificazioni di pressione. Vengono esposti i dati relativi a 28 casi e 10 referiti in dettaglio.

RESUMEN

Los focoz sépticos de la rinofaringe y de los senos paranasales dan lugar a complicaciones oftálmicas con una frecuencia digna de tenerse en cuenta; entre ellas tenemos los desplazamientos oculares, la "ptosis bulbi," la impotencia funcional de los músculos oculares, la obstrucción de la vía lacrimal, y los cambios de presión intraocular. Se presenta una estadística de 28 casos, de los que diez se exponen con detalle.

SUMARIO

Complicações oftalmicas causadas por fócos sépticos no naso-faringe e seios paranasais ocorrem com tal frequencia que merecem maior atenção. As complicações compreendem deslocamento ocular, restrição na motilidade ocular, ptóse, bloqueio dos canais lacrimais e modificações de pressão no fundo de olho. São apresentados 28 observações, sendo 10 descritas em detalhe.

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The world's experience of professed seers has on the whole been very fortunate. In the main, they are a shady lot with a bad reputation. Even if we put aside those with some tinge of insincerity, there still remain the presumptuous, ignorant, incompetent, unbalanced band of false prophets who deceive the people. On the whole, the odds are so heavily against any particular prophet that, apart from some method of testing, perhaps it is safer to stone them, in some merciful way.

—*Whitehead*

Otorhinolaryngologic Surgery

Tumors and Cysts of the Neck

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Surgical pathologic conditions of the neck may approximate a hundred other conditions. The proper diagnosis and treatment of these lesions, therefore, requires knowledge of an easily understood classification dividing the subject into seven main headings. Such a classification is here presented.

No attempt is made to discuss in detail such subjects as goiter and various tumors of the thyroid and parathyroid. These constitute a subject in themselves.

The importance of a clear understanding of the anatomic structures of the neck and their relations is emphasized.

Cervical nerve block, supplemented by scopolamine and barbiturates, is the anesthesia of choice for most tumors and cysts of the neck.

The importance of early diagnosis and treatment is stressed.

FOR proper evaluation and treatment of the many varied tumors and cysts of the neck it is essential to have clearly in mind a simple but comprehensive classification. A few such studies have been presented, but unless one is a pathologist it may be difficult to understand the nature of the condition and the correct mode of procedure.

It appears that the following classification, as worked out by myself in previous studies,[1] does fulfill these requirements and will simplify the problem of the surgeon in dealing with the hundred or more pathologic lesions located in this region.

Classification.—A convenient classification is as follows:

1. Tumors of the thyroid and parathyroid glands
   - A. Thyroid
     1. Adenoma
     2. Carcinoma
     3. Sarcoma
   - B. Parathyroid
     1. Adenoma
     2. Carcinoma
2. Tumors of the salivary glands
   - A. Mixed tumor
   - B. Primary malignant tumor
   - C. Cyst
3. Primary tumors of the lymph glands
   - A. Hodgkin's disease
   - B. Lymphosarcoma
   - C. Lymphoepithelioma
   - D. Leukemia
   - E. Endothelioma

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4. Secondary tumors of the neck
   A. Metastasis from the buccal cavity
   B. Direct extension from the buccal cavity
   C. Metastasis from below the clavicle
5. Benign tumors
   A. Lipoma
   B. Myoma
   C. Dermoid
   D. Chondroma
   E. Hemangioma
   F. Lymphangioma
   G. Atheromatous cyst
   H. Sebaceous cyst
   I. Fibroma
   J. Adenoma
   K. Keloid
   L. Cylindroma
   M. Xanthoma
6. Unusual tumors
   A. Mikulicz's disease
   B. Tumor of the carotid body
   C. Neuroblastoma
   D. Neurofibroma
   E. Ganglioneuroma
   F. Boeck's sarcoid
7. Cysts and fistulas
   A. Thyroglossal
   B. Branchial
      1. Benign
      2. Malignant
   C. Hygroma
   D. Epidermal
   E. Sublingual
8. Inflammatory lesions
   A. Nonsuppurative lymphadenitis
   B. Suppurative lymphadenitis
   C. Tubercular lymphadenitis
   D. Diffiuse cellulitis (Ludwig's angina)
   E. Actinomycosis
   F. Blastomycosis
   G. Sporotrichosis

1. *Tumors of the Thyroid and Parathyroid Glands.*—This in itself is a subject of which space does not permit lengthy discussion here. The subject might be summarized as follows: It has been shown by studies of Marine and by those in Switzerland, Wisconsin, Michigan and elsewhere that it is possible to prevent the development of simple diffuse colloid goiter. Since most adenomatous goiters have their origin in neglected colloid goiters and since most malignant lesions of the thyroid are associated with adenomatous goiters, the question of malignant disease of the thyroid becomes, to a considerable extent, a matter of prevention. This does not include certain lesions such as the papillary type, which is, however, a relatively benign condition.

Prevention or early surgical treatment likewise would eliminate the development of toxic nodular and intrathoracic goiter, as well as the huge and often formidable types illustrated in the text.

Fortunately the parathyroid tumors, such as adenomas and carcinomas, are so relatively uncommon that they seldom present a problem to the general surgeon. The relation of these lesions to renal calculi is one that should always be remembered.

2. *Tumors of the Salivary Glands.*—Here it is most important to educate the general physician and the patient to the value of early surgical removal of the tumor, before it has grown large and ruptured its capsule. Then a benign lesion takes on a neoplastic growth, and, although it seldom metastasizes elsewhere in the body, it may recur and recur locally and eventually cause death. This applies especially to lesions of the parotid gland, which demand total eradication of the tumor and, at the same time, preservation of the facial nerve.

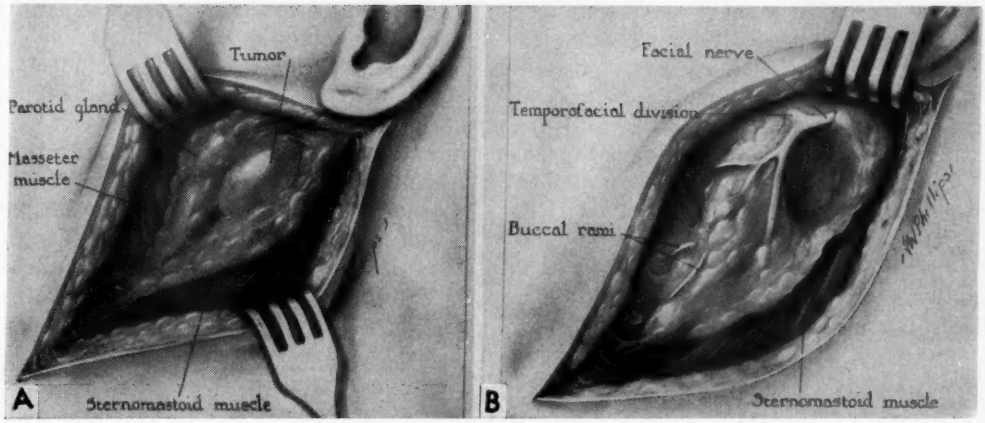

Fig. 1.—*A*, parotid gland divided, exposing capsule of tumor. *B*, tumor removed; facial nerve exposed and its relation to tumor and parotid gland demonstrated.

3. *Primary Tumors of the Lymph Glands.*—All lesions classified as primary tumors of the lymph glands present a rather hopeless prognosis. Occasionally the very early removal of a Hodgkin's gland will seemingly effect a cure, but one wonders in such instances if the pathologist has not erred. Over the years I have come to realize that he, like the surgeon, is not always right. Despite the use of mustard gas and the many new forms of chemical therapy, life expectancy remains short for patients in this group.

4. *Secondary Tumors of the Neck.*—Marked advances in surgical technic and in the use of roentgen rays, radium and chemicals have considerably improved the prognosis for this group. The patient may live for months or, occasionally, for years.

5. *Benign Tumors.*—It is always a source of great satisfaction to the surgeon when a lesion that clinically appeared to be malignant proves grossly or microscopically benign. Such a case was that of a young man who was referred to me because of a hard, fixed, rapidly growing mass in the neck, situated just in front of and beneath the sternocleidomastoid muscle. From its location I might have suspected a branchial cyst, but I had never heard of, and have never encountered, such an entity. With considerable difficulty a very hard mass thought to be a sarcoma was dissected from the deep vessels and structures and was finally successfully removed. This proved to be the only recorded case of a calcified branchial cyst.

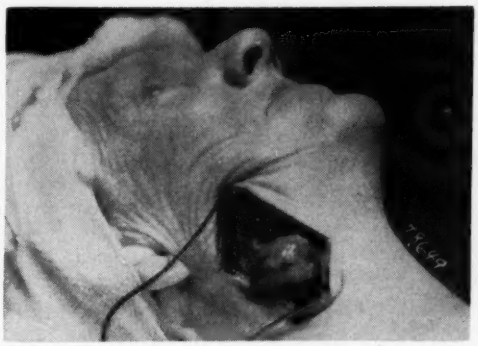

Fig. 2.—Removal of parotid tumor with region under nerve bloc anesthesia.

On another occasion a middle-aged woman consulted me about a soft, freely movable mass in the middle line of the neck, which had been present for many years. I told her this undoubtedly was a cyst of the thyroglossal duct and that, although it was not a simple surgical pro-

cedure to remove it, no risk was entailed, though the operation might require an hour or more. It was somewhat embarrassing later to explain that the operation required only ten minutes because, instead of a cyst, the lesion was a simple lipoma.

It is well to remember that a lipoma may occur in almost any location and that, very rarely, it may undergo malignant change. Then, too, one should know that unless the entire capsule of a sebaceous cyst is removed, recurrence may develop.

6. *Unusual Tumors.*—My introduction to one of this group was interesting. A 50-year-old man consulted me because of the fact that his mouth was so dry he could no longer continue as a singer. When I examined his mouth, my attention was immediately called to the parchment-like dryness of the tongue. As I looked at this patient, it seemed that his eyes were half-closed and that his face was rounded like the moon. Search of the literature confirmed the suspicion that this was a case of Mikulicz's disease that fulfilled the triad of symptoms described by this German doctor in 1879 at Königsberg: a parchment-like dryness of the tongue, symmetric enlargement of the salivary glands and narrowing of the palpebral fissures.

Fig. 3.—Rare sarcoma of thyroid gland.

Fig. 4.—Lipoma in site simulating cyst of thyroglossal duct.

Theretofore this condition had been treated with high voltage roentgen therapy or operation, but in this instance penicillin was tried, and in a few weeks all the signs and symptoms had disappeared.

About two years after this experience a woman came to see me because of bilateral enlargement of the submaxillary glands. Not suspecting the true condition, I removed one of these for biopsy, and it proved to be another instance of Mikulicz's disease. Still later another woman presented all the characteristic signs and symptoms of the disease, and she was successfully treated with roentgen therapy. A study of the American literature revealed fewer than 100 true cases of this unusual syndrome, fulfilling Mikulicz's postulates.

Boeck's sarcoidosis is a granulomatous disease of unknown cause, affecting the reticuloendothelial system. In the neck it may simulate Hodgkin's disease, but it differs from the latter in that it usually is a benign condition, running a chronic course but with spontaneous remissions. Not only does it affect the lymph nodes of the neck and other parts of the body, but it may attack the lungs, bone marrow, skin, liver and spleen.

An interesting case of this disease was

Fig. 5.—*A*, cyst of thyroglossal duct. *B*, postoperative view of patient after removal of cyst with nerve block anesthesia.

one in which I did a splenectomy for a huge splenomegaly, one of 24 reported in the literature.

Since the disease can be diagnosed only by biopsy, this is required when a lymph node enlargement of long duration is discovered in the neck. If pathologic examination shows solitary and conglomerate collections of epithelioid cells in tubercle-like formation, sarcoidosis is the probable cause. So long as the disease remains confined to the cervical glands, the patient has little to fear and may be assured of its relatively benign and chronic nature.

Tumor of the carotid body is another relatively rare lesion of the neck that for many years was considered malignant. Though this may be true, its rate of growth is protracted, so that the patient may live for years. The tumor is so slow to invade the carotids that its early diagnosis may permit removal without too great a risk. The external carotid is involved first, but when the common carotid becomes invaded, ligation of this vessel in an elderly patient is attended by considerable risk. This type of tumor may be mistaken clinically for sarcoma, as it tends to push forward the sternocleidomastoid muscle.

Neurofibromas are rarely observed in the neck and should be removed surgically, not treated by roentgen or other therapy.

7. *Cysts and Fistulas.*—Thyroglossal and branchial cysts of the neck are neither rare nor common. As congenital anomalies they are not infrequently encountered in children, the former occurring in the midline and the latter just in front of and beneath the sternocleidomastoid muscle. Thyroglossal cysts were formerly considered benign, but in recent years at least

2 cases of malignant change have been reported.

In a series of approximately 50 cases of branchial cyst I have encountered 2 carcinomas. As with nearly all operations on lesions of the neck, nerve block, supplemented with scopolamine and barbiturates, has been successfully used. Such cysts can offer some technical difficulty of successful removal, since they generally arise in close proximity to the deep vessels and nerves and in time become deeply attached.

For successful removal of a cyst of the thyroglossal duct one must follow the cyst tract up to the hyoid bone. If it extends above the bone, a section of the middle of the bone must be removed and the tract completely excised to the base of the tongue. Unless this is done the cyst will recur, and I have had to operate upon several patients in whose cases the surgeon had failed to carry out this important procedure.

Thyroglossal sinuses are rare, and I have operated on only 3 cases. The patient usually complains of an occasional bitter taste in the mouth and an occasional discharge just above the clavicle.

Hygromas in infants and children may grow to a large size, sending fingerlike projections down into the mediastinum, and their removal is a rather formidable surgical procedure.

The most interesting cyst of the neck that I have encountered is the sublingual type, of which 3 cases have been observed. The paucity of knowledge concerning these cysts may be judged from the fact that a search of more than 20 American surgical tests revealed little or nothing on the subject.

If the general surgeon is confronted with such a problem, he must turn either to the *Archives of Otolaryngology* or to the foreign literature to enhance his knowledge. The literature contains reports of the following types of cyst of the floor of the mouth: dermoid cyst, ranula, hygroma and thyroglossal cyst. My report added 3 cases, 1 of epidermal cyst and 2 of dermoid cyst.

In this condition the cyst usually develops in a child or a young person and may grow rapidly, so that it becomes visible in the midline of the neck, just below the mandible. At the same time it becomes enlarged in the floor of the mouth, so that the tongue is elevated, deglutition is interfered with and even dyspnea may occur. A recent case of my own was that of a 9-year-old boy whose symptoms had developed so rapidly that within eight months of the time of onset surgical relief was required. With the region under intratracheal anesthesia, a transverse incision 6 cm. long was made over the base of the cyst, and the latter was gently shelled out of its bed intact. The muscles were then closed with No. 0000 plain catgut and the mucous membranes sutured with interrupted sutures. The incision was closed without drainage, contrary to practice as reported in the literature. Convalescence was uneventful.

Finally, it is essential that the surgeon have a comprehensive knowledge of the important anatomic structures of the neck and their relation to one another before attempting what may appear to be a simple procedure and yet may endanger vital structures.

8. *Inflammatory Lesions.*—Although these conditions may not properly be grouped under the heading of tumors and cysts of the neck, they are none the less lesions that not infrequently must be differentiated and treated surgically. Antibiotics have brought about a major advance in the successful treatment of such conditions as Ludwig's angina, which once was a serious and even fatal condition. Then, too, advances in the dairy industry have all but eliminated the once common tuberculous lymphadenitis.

CONCLUSIONS

Surgical pathologic conditions of the neck may approximate a hundred other conditions. The proper diagnosis and treatment of these lesions, therefore, requires knowledge of an easily understood classification dividing the subject into eight main headings. Such a classification is here presented.

No attempt is made to discuss in detail such subjects as goiter and various tumors of the thyroid and parathyroid. These constitute a subject in themselves.

The importance of a clear understanding of the anatomic structures of the neck and their relations is emphasized.

Cervical nerve block, supplemented by scopolamine and barbiturates, is the anesthesia of choice for most tumors and cysts of the neck.

The importance of early diagnosis and treatment is stressed.

CONCLUSIONS

Les états pathologiques chirurgicaux du cou peuvent présenter une centaine d'aspects différents. C'est pourquoi le diagnostic et le traitement correct de ces lésions requièrent la connaissance d'une classification claire divisant ce sujet en sept groupes principaux, telle que l'auteur la décrit ici.

Il ne tente pas dans le cadre de ce travail d'entrer dans le détail d'affections telles que le goître et diverses tumeurs de la thyroïde et des parathyroïdes, qui constitutent un sujet à part.

L'importance d'une bonne connaissance des structures anatomiques du cou et de leurs interférences est à souligner.

Le bloquage du nerf cervical complété par l'administration de scopolamine et de barbituriques, représente l'anesthésie de choix pour la plupart des tumeurs et kystes du cou.

L'auteur insiste sur l'importance d'un diagnostic et d'un traitement précoces.

SCHLUSSFOLGERUNGEN

Bei chirurgisch—pathologischen Erkrankungen des Halses können hundert verschiedene Zustände in Frage kommen. Die Diagnostik und Therapie dieser Erkrankungen erfordert daher das Vertrautsein mit einer leicht fasslichen Klassifizierung. Eine solche, die das Gebiet in sieben Hauptgruppen einteilt, wird in der vorliegenden Arbeit dargestellt.

Es wird kein Versuch unternommen, auf die Einzelheiten gewisser Gegenstände wie z.B. der Kröpfe und verschiedener Geschwülste der Schilddrüse und der Nebenschilddrüsen einzugehen. Dies sind besondere Gebiete eigener Art.

Hervorgehoben wird die Wichtigkeit eines klaren Verständnisses der anatomischen Gebilde des Halses und ihrer Beziehungen zueinander.

Die Anästhesie der Wahl ist für die meisten Geschwülste und Zysten des Halses die Blockierung der Zervikalnerven unterstützt durch Skopolamin und Barbitursäurepräparate.

Auf die Wichtigkeit frühzeitiger Diagnostizierung und Einleitung der Behandlung wird besonders hingewiesen.

CONCLUSIONES

La patología quirúrgica del cuello comprende más de 100 enfermedades cuyo diagnóstico y tratamiento requiere previamente una clasificación adecuada de las mismas en siete grupos distintos, tal como se presenta en este artículo.

En esta clasificación no se incluyen los bocios ni los tumores del tiroides y las paratiroides, que forman un grupo aparte.

Se insiste en la importancia de conocer bien la anatomía topográfica del cuello y sus relaciones, y se señala que la anestesia

de elección en esta región para extirpar la mayor parte de los tumores y quistes es la anestesia regional de los nervios cervicales combinada con la escopolamina y los barbitúricos.

Se hace hincapié en la importancia del diagnóstico precoz y el tratamiento inmediato.

SUMARIO

Situações cirurgico-patológicas do pescoço, podem levar ao aparecimeto de uma centena de outras condições. O diagnóstico apropriado e tratamento déstas lesões, requerem conhecimento de uma classificação facilmente intelegível, dividindo-se o tema em 7 itens principais.

A classificação é aqui apresentada.

O A. não discute problemas táis como bócio e varios tumores da tireioide e paratireoide.

Acentua a importancia de um conhecimento amplo das estruturas anatomicas do pescoço e suas relações.

A anestesia de eleição para a maioria dos tumores e cistos do pescoço é a de bloqueido do nervo cervical, suplementada com escopolamina e barbituratos. Chama a atenção para a importancia do diagnóstico precoce e tratamento.

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Of the miseries the hypochondriacs experience the following extract of a letter to a physician will afford a specimen: "My poor body is a burning furnace, my nerves red-hot coals, my blood is boiling oil; all sleep has fled, and I am suffering martyrdom. I am in agony when I lie on my back; I cannot lie on either side; and I endure excruciating torture when I seek relief by lying on my stomach; and, to add to my misery, I can neither sit, stand, nor walk." The fancies of hypochondriacs are frequently of the most extraordinary nature: one patient imagines that he is in such a state of obesity as to prevent his passing through the door of his chamber or his house; another impressed with the idea that he is made of glass, will not sit down for fear of cracking; a third seems convinced that his head is empty; and an intelligent American, holding a high judicial seat in our West Indian colonies, could not divest himself of the occasional conviction of his being transformed into a turtle.

—*Millingen* (circa 1839)

Proctologic Surgery

Trans-Sacral Removal of Rectal Lesions

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A technic of direct surgical approach to rectal lesions located above the sphincters is presented. Both its advantages and its limitations are discussed, the author pointing out that in many cases of rectal tumor it may enable the surgeon to avoid resorting to unnecessarily radical surgical procedures. Notes on the use of this technic and its results in 26 cases are presented.

IN THE surgical management of pathologic conditions of the rectum, the surgeon is forced at times, in the light of conscientious judgment, to make a compromise in his choice of an operative procedure.

He encounters inoperable metastatic malignant tumor of the rectum with profuse bleeding from the primary lesion, with or without pain, usually treated unsuccessfully from a symptomatic standpoint with radium or cobalt therapy; the primary localized rectal neoplasm, inoperable from the standpoint of radical abdominoperineal resection because of the presence of cardiovascular disease or some other concomitant serious condition. He is confronted with early, noninvasive lesions, such as the malignant adenoma, and with nonmalignant rectal lesions that do not justify sacrifice of that organ. The importance of salvaging a small portion of the rectum in extensive operations on the lower intestines has been pointed out by many investigators, including Black, Ayelett, and Vaughan.

Removal of the rectum because of a large villous tumor or a nonmalignant stricture is indeed a great sacrifice, particularly when the disease can be eradicated or satisfactorily corrected by a less radical operative procedure.

Since adding to my own armamentarium the trans-sacral or posterior rectotomy approach for palliative resection or surgical treatment, I have assumed a more relaxed mental attitute toward combating all types of rectal surgical disease. I find it possible to attack and remove satisfactorily, with preservation of part of the rectum, many rectal lesions otherwise subjected to radical abdominoperineal resection or prolonged low primary anastamosis, with a high incidence of postoperative complications. Anyone who performs a moderate number of rectal operations can recall incidents of self-condemnation after radical anteroposterior

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procedures when the final gross appearance of the rectal lesion revealed a noninvasive localized process. Must one adhere to the all-or-none dictum? Is it not better, within the bounds of intelligent appraisal based on experience, to slice thinner and preserve otherwise healthy useful tissue when possible? Localized, noninvasive malignant lesions of the upper part of the colon are removed by simple segmental resection. Many such lesions of the rectum can be extirpated in a similar manner. Adequate exposure can be attained in most cases without undue difficulty. If indicated, division of the sphincter may be done, but this is rarely necessary.

Prior to the antibiotic era I used this operative approach in fewer than half a dozen cases because of the high incidence of complications—pelvic cellulitis, abscess, high fistula formation and proctitis with intractable diarrhea. With a modern routine of preoperative and postoperative treatment, however, I unhesitatingly perform this operation when it is indicated. My postoperative complications have been practically nil.

The conscientious surgeon is ever alert to judge what is best for his patient, first in preserving life—and very closely associated—in preservation of healthy tissue and maintenance of physiologic function of an organ that is only partially involved. In the recent past, Turnbull presented a treatise on nonradical treatment of adenomas of the rectum with localized sites of adenocarcinoma, a lesion not too infrequently removed by radical abdominoperineal or low anterior resection with primary anastomosis. Lesions of the upper and middle portions of the rectum apparently present considerable difficulty to many surgeons, and as a rule the most radical or "surest" type of operation is performed. Why not ignore the criticism of the armchair critics, as outstanding men—Bacon and Babcock, for example—have done and use one's own best judgment in attacking such lesions and in preserving some degree of rectal function if at all possible?

The trans-sacral posterior rectotomy approach has attracted only limited attention in the past forty-six years. It was described in the English literature by Kelsey in 1895. A short time later it was mentioned by French surgeons, especially Cureo and Seneque, who performed excision of tumors and primary anastomosis by this approach. As has been mentioned, prior to the advent of antibiotics for preparation of the bowel, the frequency of postoperative complications limited the usefulness of the procedure.

I should like to present my own method of surgical management of certain tumors and other lesions of the rectum, which includes the modified trans-sacral and posterior rectotomy approach.

Preoperative Preparation.—One of the highlights I stress in preparation is to obtain sterilization of the colon and rectum as near the absolute as possible. In order to accomplish this, the bowel must be thoroughly cleaned of all solid fecal matter.

On the third day prior to the operation 2 ounces of castor oil is administered; the diet is one of minimal residue. The patient's cooperation is elicited by telling him which foods to reject. Prompt and thorough cleansing of the colon and rectum, in addition to the effect of the castor oil, is obtained by irrigation. The latter consists of a daily enema of normal physiologic solution of sodium chloride. This solution is preferred to tapwater as a means of preventing water intoxication. Intensive irrigations are avoided in order to prevent variable but considerable losses of potassium, which predispose to postoperative hypokalemia. In recent cases I have used, in addition, Pericolace (diocytl

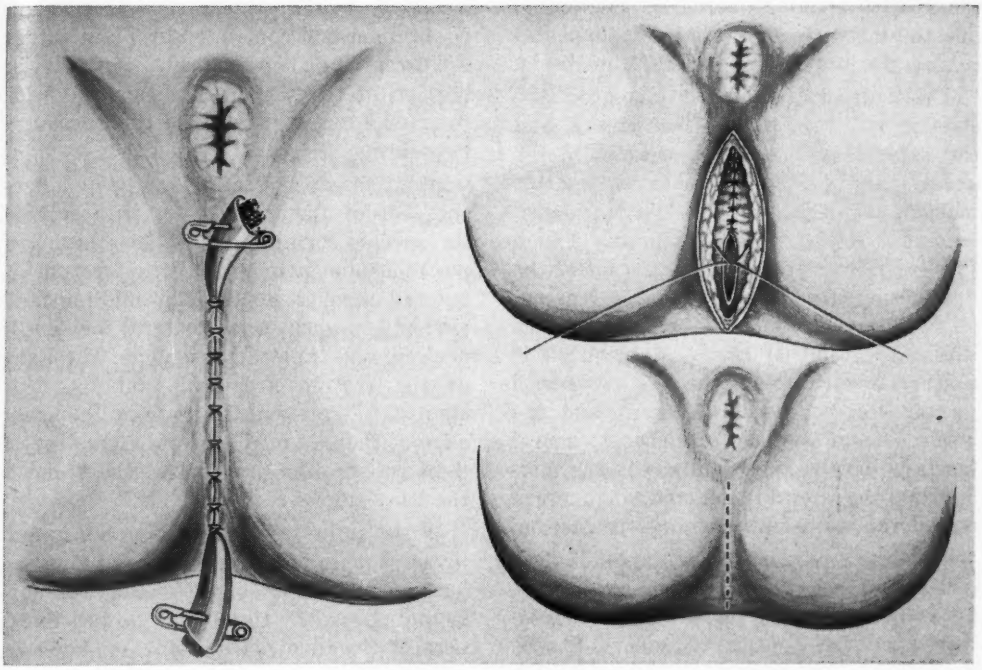

Fig. 1.—Initial incision and closure.

sodium sulfosuccinale) in doses of 300 mg. twice daily, at the beginning of treatment, to liquefy the intestinal contents and assure thorough cleansing.

Nisulfazole, in the dosage of two ounces is instilled into the rectum, with a No. 18 catheter and Reyfuss syringe, each evening before the patient retires, beginning with the first night of hospitalization.

In my early series of cases, to determine the antibiotics of choice to be used in the preoperative course, I carried out fecal bacteriologic studies. Swabs from the rectal mucosa were obtained for gram-stained smears, cultural studies and sensitivity tests. This practice was discontinued upon the adoption of the modern "short course" regimen of antibiotic presurgical preparation. I have used, with great satisfaction, the combination of Erythromycin and Neomycin, administered in doses of 1 Gm. of Neomycin and 0.5 Gm. of Erythromycin every eight hours for forty-eight hours before the operation. This combination has an effective suppressive action on the coliform flora as well as on staphylococci and streptococci.

A liquid diet is ordered for the twenty-four hours immediately before the operation.

The lower part of the back, the buttocks and the anal regions are cleansed thoroughly, after shaving, on the day prior to the operation, with castile soap and a standard antiseptic solution (Zephiran). This is done after administration of the last cleansing enema before the patient is taken to the operating room.

Operation.—The position of the patient may be either the left Sims or the classic jackknife prone; the two have been used with equal satisfaction. The anesthetist determines the anesthetic of choice. This has consisted of simple saddle block anes-

thesia with heavy Nupercaine; low spinal anesthesia with Pentothal supplementation, and endotracheal general anesthesia.

The buttocks are maintained on the stretch with tape or by other means, and the skin is prepared and draped in the usual manner. A curvilinear or midline incision is made from the second sacral landmark to a point approximately 1 inch (2.5 cm.) from the posterior aspect of the anal verge, stopping just short of the external sphincter muscle. The electric cutting current is not used. The incision is carried inward to expose the postsacral fascia, the sacrococcygeal joint and the lower part of the sacrum. The postsacral fascia is incised longitudinally in the midline, and the lateral fascia-areolar juncture is undercut to permit adequate retraction.

The retrorectal space is exposed after incision of the fascia propia. By blunt dissection, the posterior and lateral rectal walls are freed of attachments to the surrounding structures. The coccyx is disarticulated easily on severance of the pubococcygeus portion of the levator muscle at its point of attachment. Hemostasis is obtained and controlled by plain catgut ligatures. Sufficient segments of the lower portion of the sacrum are removed with rongeur forceps to provide the necessary exposure.

Blunt finger dissection easily mobilizes the rectum from the anterior aspect of the sacrum, bringing into view the lower peritoneal attachments. The rectum is entered through a posterior midline incision or a slightly posterolateral incision if desired, and exploration is done. The walls of the rectum are held taut by Allis clamps. To prevent injury from the lower edge of the trimmed sacrum, a padding of light rubber dam draping is used to cover the bony edge.

With the entire rectum exposed, a noninvasive malignant adenomatous polyp can be excised, together with adequate surrounding healthy tissue and the full thickness of the involved bowel. One-layer or two-layer closure may be used. Suction is extremely helpful when extensive resection is done, and also in the extirpation of

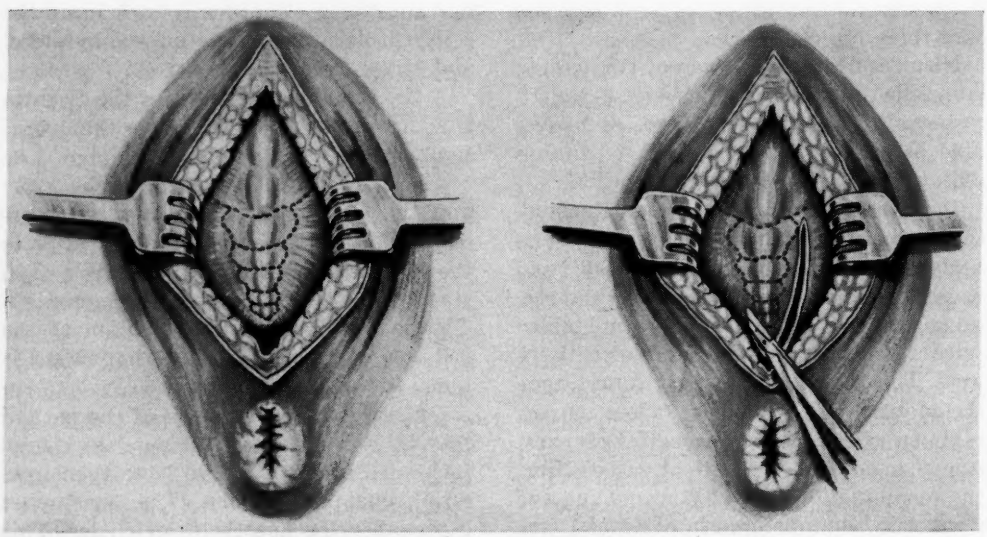

Fig. 2.—Coccyx exposed and incision through fascia begun.

a villous tumor. Drainage from the sigmoid may be controlled by gauze tampons inserted into the lumen.

When segmental or more radical resection is performed, the surgeon's finger is hooked around each levator muscle and the muscle attachment severed as close to the pelvic wall as possible. The peritoneum is incised circumferentially and the lower sigmoid freed, so that, with the rectum, it may be brought out of the wound and the lower part of the rectum dissected anteriorly from the vagina or seminal vesicles and prostate. In the last-mentioned mobilization, both careful finger dissection and sharp dissection are used, the rectum being held taut with Babcock clamps.

When the superior hemorrhoidal vessels have been ligated, the rectum is transected and the clamps immediately removed, to prevent injury to the small vessels. Transection is carried out usually 3.5 cm. from the border of the tumor. The lower and upper rectal segments are anastomosed by a one-layer closure in most cases. Prior to anastomosis, both segments are irrigated thoroughly with distilled water, in order to wash out tumor cells. For four days afterward the divulsed sphincter mechanism is kept open by a medium-sized rectal tube passed well above the anastomosis and secured by silk suture to the perianal skin on both lateral surfaces. In resection, usually the middle hemorrhoidal vessels, together with the superior ones, are sacrificed. If simple wedge-shaped or elongated segments are removed, however, as for malignant adenoma, benign adenoma, villous tumor, etc., one or both middle hemorrhoidal vessels can frequently be preserved.

In 1 of my cases, that of a psychotic patient with procidentia, a horseshoe-shaped segment of the rectum involving a 1¾ inch (3.4 cm.) strip posteriorly, with gradual narrowing laterally to the anterior surface when the incision ended, was removed. Primarily anastomosis was done with the use of two layers of interrupted sutures, the inner layer of chromic intestinal No. 0 catgut and the outer of No. 4-0 interrupted cotton. A satisfactory result was obtained.

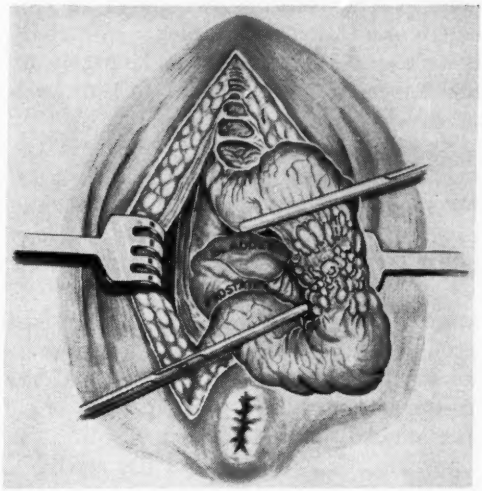

Fig. 3.—Malignant disease of upper part of rectum with adequate mobilization prior to resection.

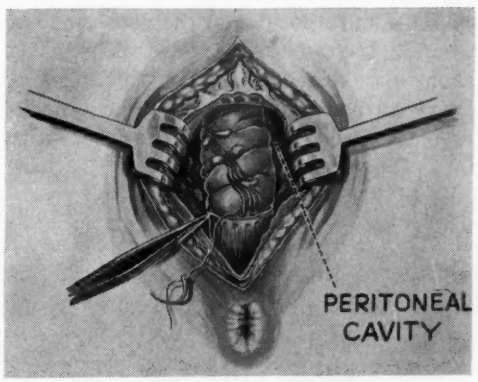

Fig. 4.—Partial rectectomy performed for malignant tumor, with closure.

In 2 other cases, in which midrectal inflammatory strictures were involved, the incision was carried longitudinally through the posterior aspect of the granulomatous contracture into the rectal

lumen. The incision was closed in two layers in a transverse fashion. In each of these cases, only division and ligation of the superior hemorrhoidal vessels was necessary.

Space does not permit going into the technical details employed in this series, but the history of the individual cases and diagnosis will be presented later. I may add that in my resections, particularly when the superior hemorrhoidal vessels were ligated, bleeding from the incised rectal edges was controlled by clamp pressure. Ligatures were avoided. There were no incidences of faulty healing. I strongly recommend using interrupted sutures in approximating the edges of the bowel.

Upon closure, a penrose drain is placed on each side of the rectum, emerging at opposite ends of the external incision. I sprinkle sulfa powder in the depths of the wound. Layer closure is used. The fascia propria is approximated with cotton or heavy chromic catgut. The subcutaneous areolar tissue is brought together with several interrupted plain catgut sutures. Closure of the skin is completed with cotton sutures. It is my opinion that delayed skin closure is not routinely necessary.

The patients are instructed to avoid the supine position for four days. Upon return of the bowel sounds, usually on the second day, the administration of Erythromycin and Neomycin is reinstituted (every six hours for three days and then every twelve hours for the following four days). On the sixth day the liquid diet is discontinued and solid foods are allowed. The drains are removed on the sixth and seventh days. Pericolace and Cremosuxidine are given on the sixth day, and usually within the following two days a bowel movement occurs, with a soft stool. The patient is discharged on the eighth to tenth day. Slight postoperative serous discharge may occur, but it usually subsides within a week.

My series of cases in which this technic was employed consists of the following groups:

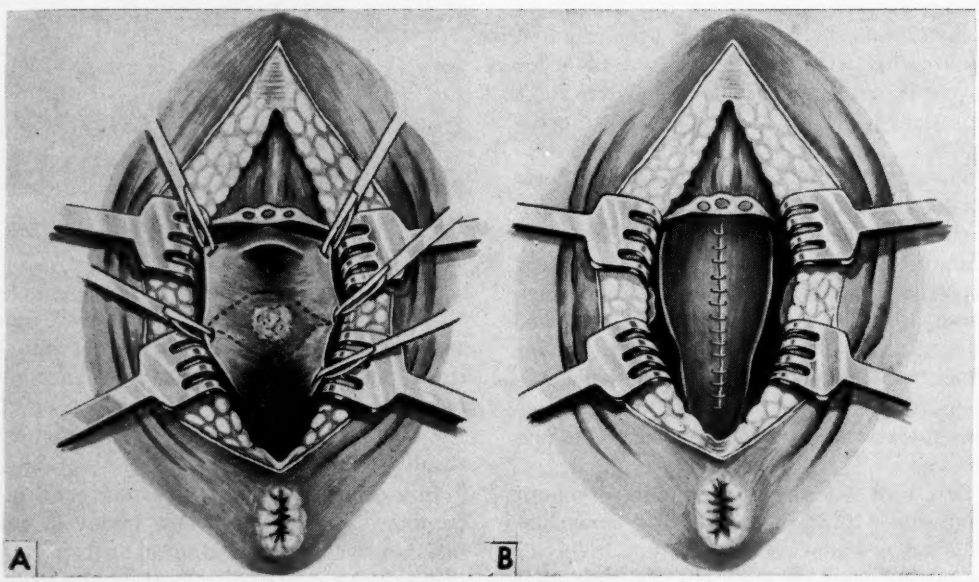

Fig. 5.—*A*, wedge incision for malignant adenoma; *B*, rectum closed with interrupted cotton suture.

1. Three cases of rectal stricture
   (a) Chemical proctitis
   (b) Arrested ulcerative proctitis, inactive for twenty-two years.
   (c) Idiopathic, probably congenital atresia, localized.

2. Fifteen cases of adenocarcinoma of the rectum
   (a) Six of inoperable tumors producing either constant bleeding or severe pain. All had been treated with roentgen or radium therapy with no relief of symptoms.
   (b) Nine cases of malignant adenoma in the middle and upper portions of the rectum. In the latter group, sufficient wedge-shaped involved segments of the rectum were excised and simple layer closure with No. 4-0 cotton was done. In the former group, complete resection with primary anastomosis was performed in 4 cases and partial intestinal bowel resection in the other 11.

3. Six cases of villous tumor.

In 4 of these cases the tumor had been treated by repeated office fulguration, with unsatisfactory results. (I am sure all surgeons have encountered the difficult, messy and time-consuming situations that can arise in office treatment of moderate-sized rectal villous tumors by staged fulguration. Usually, we are led by negative biopsy reports to destroy by fulguration or remove by electric snare, in staged office visits, such accessible rectal tumors. The mucus secreted by these tumors is atypical and foul-smelling and has an adhesive gel characteristic. Mucus production appears to be stimulated by local treatment.

The other 2 villous tumors in the series revealed foci of adenocarcinoma. All lesions were excised through a posterior rectotomy approach. An adequate amount of normal mucosa adjacent to the base of the tumors was excised and shown by microscopic section to be free of involvement. The base of the largest villous tumor removed was Z-shaped and measured 4.5 by 2.5 cm. Foci of carcinomatous degeneration were discovered microscopically in 3 of the lesions previously reported after office biopsies.

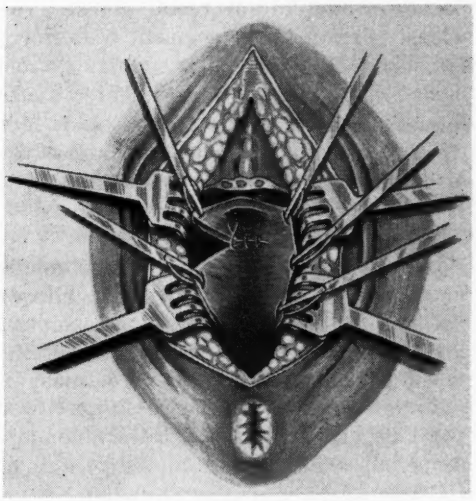

Fig. 6.—Closure after wedge-shaped excision of adenocarcinoma grade I.

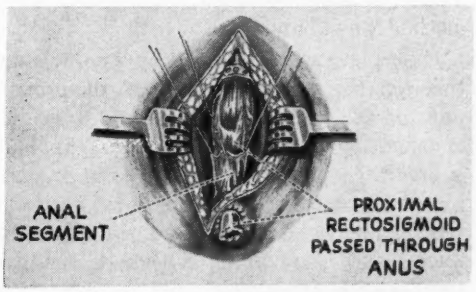

Fig. 7.—Modified pull-through procedure for carcinoma of restosigmoid.

4. One case of rectal procidentia in a psychotic female patient. Profuse rectal bleeding was observed. A semicircular segment of rectum was excised from the

posterior and lateral rectal walls. The widest portion of the segment posteriorly measured 2½ inches (6.2 cm.). Double layer closure was performed. Three weeks later the relaxed anal ring was made taut by the insertion of wire just above the level of the external sphincter. The final result was highly satisfactory.

5. One case of foreign body.

The patient in this case was a middle-aged man. A heavy metal paper clip was accidentally discovered in the rectosigmoid area during roentgen examination of the lower part of the spine, for treatment of pain low in the back. The object was partially visualized through the sigmoidoscope but could not be removed because of its firm anchorage in granulation tissue. Manipulation in attempted removal through the sigmoidoscope resulted in moderate bleeding on two occasions. This method was abandoned.

Exposure was obtained by an incision through the posterior wall of the upper part of the rectum. Because of firm anchorage by fibrous trabeculae that had grown through the loops, it was necessary to cut the metal clip into several sections with a heavy wire scissors, in order to uncoil and remove it. Although the patient was in good health and the operative removal could have been performed from above, I considered this method of approach less difficult.

COMMENT

I am certain that there has been considerable speculation and disagreement as to the value of this method of approach to the removal of rectal lesions, especially if any degree of malignancy is concerned. No one in his right mind would use such a technic, with its limited exposure and resection including the lymphatic and vascular drainage beds, for the typical invasive adenocarcinoma of the rectum. This article in no way challenges the accepted radical methods for the surgical treatment of rectal carcinoma. It is intended only to present my views, on the basis of experience, of the possible value of this procedure in cases of malignant disease, particularly when compromises must be made in view of other circumstances involving the general health of the patient.

On the other hand, I wish to recommend it as a method of preserving some part of the rectum when the lesion is in an early stage and is noninvasive. Is current statistical knowledge of all malignant rectal lesions and their behavior so thoroughgoing that a surgeon can, without individual, meticulous investigation of each case, state positively that total excision of the rectum is indicated? Have modern surgeons, in the light of modern antibiotic and surgical knowledge, extended local rectal surgical therapy to its limit?

In my opinion, this procedure also has a definite place in the surgical management of many nonmalignant lesions of the rectum.

SUMMARY

A technic for direct surgical approach to lesions of the rectum above the sphincters is discussed, including a series of cases successfully managed by this procedure. The rectal surgeon is not infrequently confronted with a compromise decision in affording relief in inoperable cases of rectal malignant disease and in preservation of the rectum and its function in cases of early localized malignant change and nonmalignant surgical lesions of the rectum.

This must not be misinterpreted as meaning that the procedure in question is recommended for the usual invasive rectal adenocarcinoma. Abdominoperineal excision of such lesions offers the best method of radical treatment, which is necessary for cure, that is known today.

ZUSAMMENFASSUNG

Es wird eine Technik des direkten chirurgischen Zugangsweges zu krankhaften Veränderungen des Mastdarms oberhalb des Schliessmuskels unter Darstellung einer Reihe von mit diesem Verfahren erfolgreich behandelten Fällen erörtert. Nicht selten muss sich der Mastdarmchirurg zu einem Kompromiss entschliessen, wenn er in inoperablen Fällen bösartiger Mastdarmerkrankung dem Kranken Erleichterung verschaffen und in Fällen frühzeitig erkannter bösartiger und nicht bösartiger chirurgischer Mastdarmerkrankungen den Mastdarm und seine Funktion erhalten will.

Der Verfasser möchte nicht in dem Sinne missverstanden werden, dass er etwa sein Verfahren für das gewöhnliche eindringende Adenokarzinom des Mastdarms empfiehlt. Für diese Erkrankung stellt die abdominoperineale Resektion die beste bisher bekannte radikale Methode, die zu einem Heilerfolge unerlässlich ist, dar.

RÉSUMÉ

Une technique d'approche chirurgicale directe pour les lésions du rectum situées au-dessus des sphincters est discutée, avec une série de cas traités avec succès selon cette méthode. Il n'est pas rare que le spécialiste de chirurgie recto-colique se voie placé devant un compromis lorsqu'il s'agit de soulager des cas d'affections rectales malignes inopérables, et de préserver le rectum et sa fonction dans les cas de modifications malignes localisées diagnostiquées précocément et de lésions chirurgicales bénignes du rectum.

Cela ne signifie nullement que la technique mentionnée soit recommandée pour les adénocarcinomes envahissants du rectum, où l'excision abdominopérinéale est le meilleur traitement radical connu à ce jour.

RIASSUNTO

Viene discussa una tecnica da impiegare negli interventi chirurgici per le lesioni del retto soprasfinteriche e presentata una serie di malati operati con successo con questo metodo. Il chirurgo del retto si trova molto spesso nell'imbarazzo della decisione quando sia chiamato a portare sollievo in caso di tumori inoperabili del retto o quando debba tentare di salvare il retto e le sue funzioni in caso di tumore iniziale o di lesione non tumorale.

Ció non significa che il metodo raccomandato debba essere impiegato in ogni caso di adenocarcinoma rettale invasivo. L'amputazione addominoperineale è ancora il metodo migliore di cura radicale fra tutti quelli impiegati al giorno d'oggi.

RESUMEN

Se trata este trabajo de la técnica de un abordaje quirúrgico directo a las lesiones rectales supraexfinterianas y se incluye la exposición de una serie de casos tratados por este procedimiento. El cirujano de recto se ve comprometido frecuentemente en casos de enfermedades rectales malignas inoperables y en la necesidad de preservar el recto y su función en casos de transformaciones malignas precoces y en enfermos con afecciones rectales benignas. No debe ser mal interpretado pensando que el procedimiento en cuestión se ha recomendado para todos los adenocarcinomas rectales invasivos.

La excisión abdominoperineal en tales casos constituye el mejor método de tratamiento radical conocido hasta hoy día.

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Thirty-five years ago the indignation of the medical profession was mostly concentrated on the "wasp waist" and tight lacing. They had a term "corset liver." It was a real condition, in which the liver was so pinched by tight corsets that a prolongation of one lobe was formed. The doctors of about the Chicago Columbian Exposition days were proclaiming the amount of harm this did. I had not thought of the disease for two decades until about a year ago I saw the autopsy of an old woman who had a liver nearly pinched in two, with one lobe hanging clear down in her pelvis. Inasmuch as she was nearly seventy-five years old at the time of her demise, had a large family of children and grandchildren, and died from being hit by an automobile, I judge the "corset liver" did not really do so much harm after all.

—Clendening

Suggested Aids to Surgical Treatment of Imperforate Anus and Congenital Malformation of the Rectum

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The author's recent experience has indicated that, in cases of congenital atresia of the rectum and anus, roentgen studies of the child in the head-down position may fail, even two or three days after birth, to reveal the true position of the rectal pouch. It is suggested that, in order to avoid an unnecessary transabdominal operation, a simple incision 1 cm. deep should always be made at the site of the anus; Rhoads' operation, if indicated, can then be performed. Should the child be in suitable condition for a transabdominal procedure, the author suggests a perineal puncture before a decision is made for colostomy. Five illustrative cases are reported.

ATRESIA of the anus and rectum occurs in approximately 1 of 5,000 newborn infants.

During the twelve years from 1948 through 1959 there were 56,625 births at Hadassah Municipal Hospital in Tel-Aviv. There were 18 cases of congenital malformation affecting the anus and rectum, i.e., 1 in 3,145 births.

The most commonly accepted classification in world literature is that of Ladd and Gross [1], who divided congenital malformations of the anus and rectum into the following four groups:

1. Patent anus and rectum, but with stenosis of one or the other.
2. Imperforate anus, the obstruction being membranous.
3. Imperforate anus with the rectal pouch ending blindly at varying distances from the perineum.
4. Normal anus and lower portion of rectum but with the upper point of the rectum ending blindly.

In the male, the condition is often accompanied by fistulas, rectovesical, rectourethral or rectoperineal; in the female, rectovesical, rectovaginal, rectum-fossa navicularis, rectum-fourchette or rectoperineal. I shall restrict this discussion to the diagnosis, and the difficulties and errors of estimating the distance from the rectal pouch to the skin.

Until a few years ago the accepted surgical approach was via the perineum, and in cases of high rectal pouch, after an unsuccessful perineal search, it was necessary to make a colostomy. Although surgical intervention for the conditions in group 2 was successful, the results with group 3 were disappointing and entailed a high mortality rate, even reaching 46

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per cent. The perineal approach in cases of high pouch is today considered the worst of all, since fistulas of the urinary tract are apt to be overlooked, while in certain cases the impossiblity of reaching the high rectal pouch and the search of the perineum are apt to injure the function of the existing sphincter muscle.

In 1944 Roads[2] initiated a new method for the treatment of high rectal pouch. This consisted of a transabdominal approach with the intention of liberating the rectal pouch, together with the distal part of the sigmoid, and subsequently making a small incision through the perineum and bringing down the liberated bowel. The advantages of this method are its low mortality rate and the fact that it involves minimal damage to the perineal tissues, particularly the sphincter, plus the possibility of easy repair of rectovesical and rectovaginal fistulas.

Today, when this method has been accepted by surgeons everywhere and has produced excellent results, accurate diagnosis of these deformities has become absolutely essential. Every surgeon is faced with the decision as to whether the transabdominal or the perineal approach should be used. The decisive questions are:

1. Does the rectum communicate with the bladder or the urethra?
2. What is the level of the rectal pouch?

If there is communication between the bowel and the urinary tract the urine usually contains meconium, but in every case roentgen examination with the bladder filled with a contrast medium is necessary to ascertain whether there is a rectovesical or a rectourethral fistula. The answer to the second question is usually obtained by taking a roentgenogram of the infant in the head-down position, as suggested by Wangensteen and Rice in 1930.[3]

Fig. 1 (*Case 2*).—Roentgenogram taken three days after birth, showing high rectal pouch. Autopsy, however, revealed a normal-sized rectum 0.5 cm. from the perineal skin.

If the gas bubble fails to rise to within 2 cm. of the metal shadow on the skin, the transabdominal approach must be chosen. This method may be misleading if there is an undiagnosed fistula, especially if it is high in the vagina, since the gas may pass out through the vagina and empty the rectal pouch. Furthermore, the thick meconium in the blind pouch is often only partially replaced by gas, and the level of the pouch appears much higher than it is.

Gross[4] stated that the roentgen picture is reliable only if twenty-four hours have passed since birth. Cases have been reported in which the gas had not yet percolated to the distal pouch of the large intestine. For this reason numerous authors have suggested taking a series of roentgenograms and following up the progress of the gas. I have encountered a number of cases in this hospital in which there were grounds for some modification in interpreting these observations and have influenced my approach to operation.

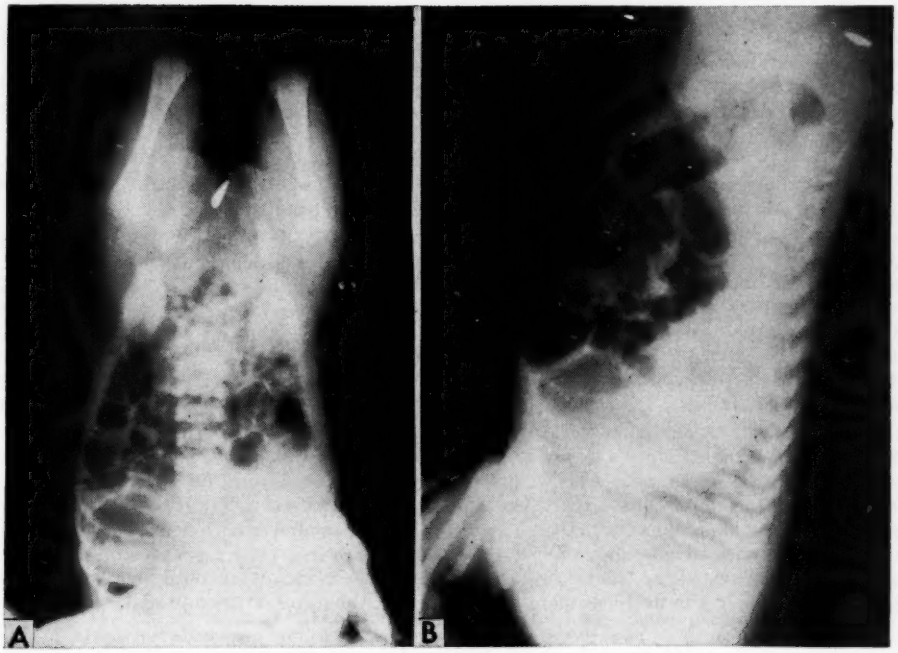

Fig. 2 (*Case 3*).—Anteroposterior (*A*) and lateral (*B*) roentgenograms, both taken with infant in head-down position twenty-four hours after birth, showing a rectal pouch over more than 2 cm. from metal marker. Clinically this child proved to have imperforate anus with normal rectum. Obstruction consisted of a membrane only.

REPORT OF CASES

CASE 1.—M. A., aged 4 days, was admitted to the children's department of the hospital on Oct. 20, 1952. A diagnosis of atresia ani was made. Roentgenogram taken by the Wangensteen-Rice method the distalmost gas was 4 cm. from the metal indicator on the skin (in the estimated position of the anus). In view of the distance of the gas from the skin, and of the fact that four days had already passed, only a colostomy was done. The child left the hospital in good condition eleven days later, with instructions to return for radical operation later on. Two months later the child was readmitted to the hospital with a fistula opening into the site of the anus, through which feces were freely extruded. A roentgenogram was taken after the fistula had been filled with lipiodol and showed a fairly wide canal, roughly 2 cm. long, entering the rectum and the distal portion of the sigmoid, which was normal. The child left the hospital in good condition with a profuse free secretion. On Sept. 9, 1953, the child was readmitted, and successful closure of the colostomy was performed.

CASE 2.—B. B., 3 days old, was admitted to the hospital on Dec. 11, 1953, and a diagnosis of atresia ani was made. Examination revealed a distended abdomen. The infant was in a generally bad condition because of ileus of three days' duration. There was no clinical sign on the perineum typical of an imperforate anus. A roentgenogram taken with the child in the head-down position showed no gas in the small pelvis. With the region under local anesthesia, a right transverse colostomy was done, but the child died twelve hours later. At autopsy a normal sigmoid and rectum, filled with meconium, were observed, with the rectal pouch only 0.5 cm. from the skin.

CASE 3.—A girl weighing 3.5 Kg. was admitted to the hospital three hours after birth, with atresia ani. Her general condition was good. Four and eight hours after birth roent-

genograms were taken by the Wangensteen-Rice method but did not show gas in the small pelvis. Twenty-four hours later the child's general condition was good, but the abdomen was distended. A third film showed the gas at the same level. Since a black spot the size of a pin's head was observed on the labium, the patient was thoroughly examined again, and in the navicular fossa a membrane was present, blocking a small fistula. After removal of the membrane, gases and meconium were passed in large quantities. A No. 14 F catheter was easily passed into the fistula. After the fistula had been filled with lipiodol it became apparent under the roentgen rays that in this case the rectum and sigmoid were normal, with a free passage.

CASE 4.—W., an infant born ten hours before admission to the children's department on Jan. 31, 1957, was examined. The diagnosis was atresia of the anus. The last roentgenogram in my series was taken twenty-nine hours after birth and showed gas about 3 cm. from the indicator on the skin. Operation by the abdominal approach was decided upon. At the operating table a puncture of the perineum was done, and at a depth of 0.5 cm. meconium was encountered.

The abdominal operation was thereupon abandoned, and an anoplastic operation was done, with local anesthesia, through a small incision at the estimated position of the anus. The infant left the hospital a week later, in excellent condition.

CASE 5.—K., aged 6 hours, was admitted to the children's department, on Sept. 11, 1957, with a diagnosis of atresia ani. The general condition was good. In addition to the anal anomaly the infant exhibited polydactylia, there being 6 toes on each foot. A series of roentgenograms was taken, with the baby in the head-down position, six, twelve, twenty-four and thirty-six hours after birth. All showed a high rectal pouch. Forty hours after birth I decided on the abdominal approach. In order to be sure, however, a puncture through the estimated position of the anus was done immediately before operation. Since no signs of meconuim were observed to a depth of 1 cm. the typical Rhoads abdominoperineal op-

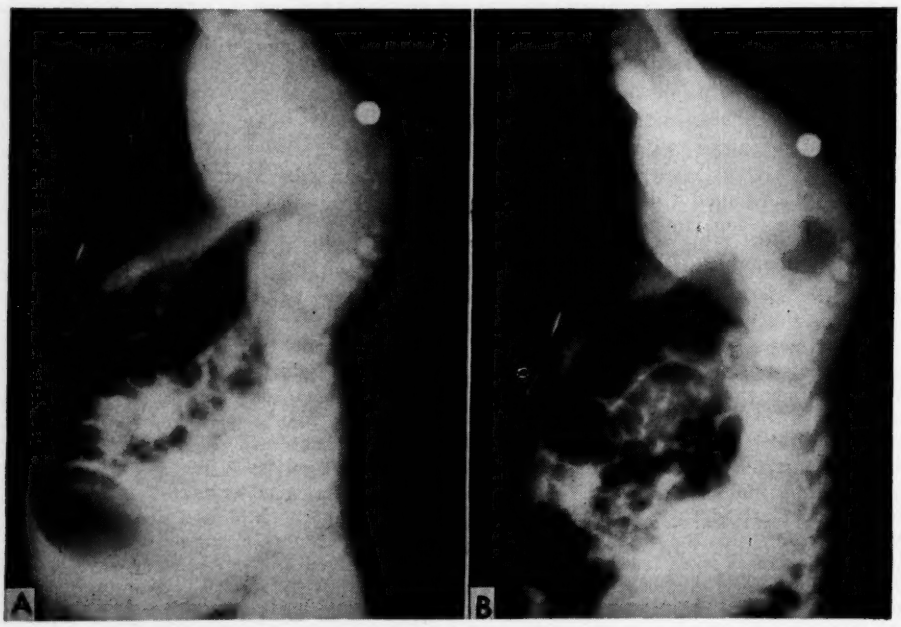

Fig. 3 (*Case 4*).—*A*, film taken twelve hours after birth; *B*, film taken twenty-nine hours after birth. Both views taken with infant in head-down position. Both show gas about 3 cm. from the marker on the perineal skin. Clinically, rectal pouch proved to be only 0.5 cm. from skin.

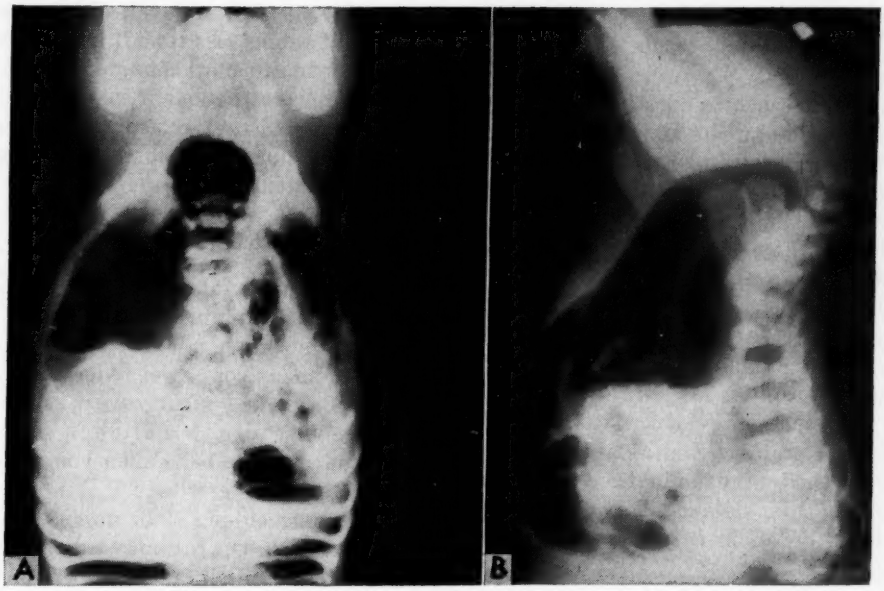

Fig. 4 (*Case 5*).—Roentgenogram taken thirty-six hours after birth, showing high rectal pouch. This was afterward confirmed clinically by perineal puncture followed by Rhoad's operation.

eration was performed. It was followed by an uneventful recovery. The puncture did not interfere with the perineal incision made in the second part of the operation.

COMMENT

Briefly it may be said that in all these cases the possibility was borne in mind that the gas might not have percolated to the distal end of the rectal pouch. And every effort was made to insure that it did so, including gentle massage of the abdomen as suggested by Bacon,[5] with control of the gas level by repeated roentgen pictures. In all these cases, morever, the external signs of proximity of the rectal pouch to the skin were absent. I was unable to discern a depression or dimple in the skin at the site of the external sphincter, nor was there any bulging of the blind end of the rectum.

In all the cases the roentgenograms showed a rectal pouch high enough to justify an abdominal approach. Nevertheless, in Case 1 perforation of the rectal pouch occurred spontaneously two months later at the site of the anus, which is undoubtedly evidence that it was situated very close to the skin. In my very tragic Case 2, autopsy revealed an error in interpretation of the roentgenogram, and I have an uneasy impression that anal exploratory incision instead of colostomy might have saved the infant's life.

In Case 3 the imperforate anus showed the rectal pouch very high. In Case 4, in spite of a roentgenographically high rectal pouch an exploratory puncture at the site of the anus saved me from the unnecessary performance of a fairly large operation.

In Case 5 the exploratory puncture did not hinder the performance of a Rhoads operation.

CONCLUSION

From these cases one can see that that even two or three days after birth the

gas may not be able to percolate through the meconium and reach the end of the bowel.

It is thus open to question whether one should decide on the abdominal operation (Rhoads) purely on the strength of the roentgen evidence since a major operation of this sort is apt to lead to such complications as damage to the important perineal nerves.

It should be noted that, although the number of cases reported is small, I have learned of similar cases from colleagues in other hospitals and in their experience too the roentgen evidence was unreliable. Morcover, Winkel Smith[6] has stated that "no method of examination can exactly estimate the distance between the skin and the bowel in cases where the bowel lies high."

I therefore came to the conclusion that one should not place 100 per cent reliance on the roentgen picture alone in the event of its showing a high rectal pouch. In cases in which the gas appears more than 2 cm. from the skin and the child is fit to undergo an operation of the magnitude of the Rhoads procedure, it is my opinion that one should start with a perineal incision to the depth of 1 cm. and without special dissection, in order to identify those cases in which the roentgen picture does not represent the true state of affairs. In the event that this incision fails to reveal the meconium, I continue with the transabdominal operation. The perineal incision will obviously be used for passage of the distal part of the freed colon. It should be stressed that this perineal incision is a small one, free of the danger of complications, and is in no way a "perineal exploration," a procedure justly condemned by Santulli[7] and other authors. It may nevertheless obviate the need of a much more extensive transabdominal intervention, as it did in Case 4.

When the child is an unsuitable candidate for the Rhoads operation, either because it weighs less than 3 Kg. or because of other malformations, one must be content with colostomy.

In these cases I recommend a preliminary puncture (not more than 1 cm.) at the estimated level of the anus.

ZUSAMMENFASSUNG

Nach den Erfahrungen des Verfassers in den letzten Jahren hat sich die Röntgenuntersuchung mit herabhängendem Kopfe auch von zwei oder drei Tage alten Babys als nicht zuverlässig in der Darstellung der wirklichen Lage der Mastdarmtasche bei Fällen von nicht perforierten Anus erwiesen.

Zur Vermeidung einer unnötigen transabdominalen Operation wird vorgeschlagen, stets eine einfache einen Zentimeter tiefe Inzision am Anus vorzunehmen; dann kann, wenn notwendig, eine Rhoads'sche Operation ausgeführt werden. In Fällen, die sich zum transabdominalen Eingriff eignen, wird, bevor die Entscheidung zur Kolostomie getroffen wird, eine perineale Punktion empfohlen. Fünf erläuternde Fälle werden mit Röntgenbildern dargestellt.

RÉSUMÉ

Il ressort de notre expérience de ces dernières années que l'exploration radiologique la tête en bas peut ne pas révéler, même deux ou trois jours après la naissance, la position véritable de la poche rectale dans les cas d'anus imperforé.

Afin d'éviter une opération transabdominale inutile, l'auteur conseille, dans tous les cas, une simple incision de 1 cm. de profondeur au niveau de l'anus; l'opération de Rhoad peut ensuite être pratiquée en cas de nécessité. Si une opération transabdominale est indiquée, l'auteur propose une ponction périnéale avant de décider la colostomie. Il présente cinq cas typiques avec clichés radiologiques.

RIASSUNTO

La nostra esperienza di questi ultimi anni ha dimostrato che gli esami radiologici eseguiti anche due tre giorni dopo la nascita possono non rivelare la vera situazione dell'amplla rettale nei casi di ano imperforato.

Allo scopo di evitare gli interventi per via abdominale si suggerisce di fare una semplice incisione di 1 cm. di profondita nella sede dell'ano; si può quindi eseguire, se necessario, l'intervento di Rhoad. Nei casi, invece, che necessitano l'intervento per la via abdominale, si consiglia di fare una puntura perineale prima di decidere la colostomia.

Vengono presentati 5 casi dimostrativi con i loro reperti radiologici.

RESUMEN

Nuestra experiencia en los últimos años nos ha demostrado que la exploración radiológici con el enfermo cabeza abajo en los casos de imperforación anal no sirve hasta pasados tres o cuatro dias del nacimiento para loaclizar la verdadera localización de el saco rectal.

El autor propone que para evitar una operación transabdominal innecesaria debe practicarse una simple incisión de un centímetro de profundidad en el sitio del ano. De esta manera, si es necesario, puede practicarse la operación de Rhoads. En los casos de indicación de operación transabdominal debe practicarse una punción perineal antes de decidir la colostomía. El trabajo viene ilustrado con cinco casos con radiografías.

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Speech is civilization itself. The word, even the most contradictory word, preserves contact—it is silence which isolates.

—*Theophrastus*

Sexual Dysfunction and Tardiness in Perineal Wound Healing After Proctocolectomy for Chronic Ulcerative Colitis

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THE nerves controlling sexual function, both male and female, follow closely to the rectum. In performing proctectomy it is easy to divide these nerves, thereby producing either a disturbance or a complete impairment of normal sexual function.

Normal sexual relations are controlled by the autonomic nervous system and the sympathetic and parasympathetic nerves. In the male, erection is controlled by the parasympathetic nerves that govern the venous sinuses, and stimulation of these nerves causes engorgement of the sessile blood sinuses, thereby producing an erection. The ejaculatory function is governed by the sympathetic system.

The distribution of these nerves and their close proximity to the rectum is such that wide excision of the rectum can easily interrupt both the sympathetic and the parasympathetic nerves. The sympathetic nerves that supply the pelvis originate in the lower thoracic and lumbar segments of the spinal cord. The greatest number of these sympathetic nerves can be found just below the bifurcation of the aorta with the large number, which is known as the presacral nerve, or the superior hypogastric plexus. This divides into the inferior hypogastric plexus. In the male these course beneath the peritoneum downward, and anterior to the rectum, across the rectovesicular pouch to the area of the ureter. In the female the inferior hypogastric nerves pass downward into the hollow of the sacrum and then forward toward the uterosacral ligament. The fibers fan out along the base of the broad ligament and in the area of the ureter and the uterine artery to the pelvic viscera. Parasympathetic fibers arise from the second, third and fourth sacral nerves. These fibers, known as the *nervi erigentes*, enter

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Since normal sexual function is controlled by nerves of the autonomic, sympathetic and parasympathetic nervous systems, wide excision of the rectum can result in sexual dysfunction. Careful dissection to the rectal wall will prevent the severing of these nerves. In the perineal phase of the operation, care should be taken to excise as close to the anus as possible, and also to sever the levator muscles at the closest possible point to the anorectum. A normal hemoglobin level and normal blood volume are of paramount importance in the healing of the perineal wound.

the inferior hypogastric plexus and fan out along with this plexus to the pelvic viscera.

In order to avoid severing these nerves, care should be taken at the bifurcation of the aorta and below, the mesentery being divided as close to the sigmoid colon as possible and the dissection carried downward as close as possible to the posterior rectal wall. Laterally the peritoneum should be incised at the point of its reflection onto the anterior rectal wall. At the rectovesical pouch and the pouch of Douglas the peritoneum should be incised as close as possible to the rectum, with preservation of as much peritoneum as possible, since beneath this peritoneum are many of the autonomic nerves. Dissection close to the rectal wall, especially at the level of the seminal vesicles in the prostate, as well as lateral dissection toward the stalk of the rectum, should be carefully done in order to prevent severance of these nerves.

In the perineal phase of the proctectomy, care should be taken to excise as close as possible to the anus, and also to sever the levator muscles as close to the anorectal area as possible. In this way very few nerves are incised, and the likelihood of disturbing sexual function is rare if the patient is in the younger decades of life. If he is 50 or older, of course, there may be a decrease in sexual activity, or the function may be so nearly completely impaired, owing to the process of aging or other factors, that in some cases it may be lost without severance of the nerves.

Healing of the perineal wound after proctocolectomy for other causes, unless there is carcinoma or some debilitating disease, is extensive, and the operation is palliative. The surgical technic of handling the perineal wound usually varies. Some close the skin with a drain, while others pack the sacral cavity and allow the wound to remain wide open. The time element of wound healing cannot always be judged by the time required for the perineal skin to close. Dead space may remain for some time before the collapse of this cavity and replacement by fibrous tissue with collagen, which reduces this dead space to a closed cavity. In many cases, if the perineal skin is closed and a small drain used, the wound apparently heals, but a month or two later serosanguinous material may appear in the drainage, or the wound may have to be opened because of infection. The basic facts concerning wound healing in this area are the same as in other parts of the body. Dead space must be dealt with in a patient whose ability to heal is somewhat impaired by chronic illness or other factors. The following factors apparently have a great deal to do with the healing of a perineal wound:

The extent of rectal infection and periproctitis where the connective tissue about the rectum is fixed, thereby preventing a collapse of the cavity and producing a much larger cavity to fill with fibrous tissue, collagen and contract.

If an anal or rectal fistula is present in the perineal area, this certainly has a great deal to do with the tardiness of the wound in healing.

The nutritional state is of the utmost importance, as it is with any other wound in healing, and hypoproteinemia is an important factor.

After ileostomy a great many patients have difficulty in maintaining the nitrogen balance, and the nitrogen reserve is somewhat reduced even though the blood may show a normal serum protein level.

Vitamin C deficiency is also an important factor in the healing of these wounds. Its exact function in wound healing is not definitely known, but it is thought to have a great deal to do with the effect on the cells in the production of collagen. Whether it acts on the cells

directly or acts on the protein, there seems to be some difference of opinion as to the exact action of this vitamin in experimental work.

A normal hemoglobin level and normal blood volume are of the utmost importance in the healing of a perineal wound and in keeping the hemoglobin level normal and the blood volume as near normal as possible.

Most of these patients have been given ACTH or cortisone therapy, and there seems to be some difference of opinion as to the degree of inhibition of wound healing; however it certainly apparently does slow up the healing.

Infection of the sacral cavity following proctocolectomy slows wound healing, whether it be proctocolectomy for chronic ulcerative colitis or for carcinoma. Infection produces an abscess wall, thereby causing fixation of the tissues and organs of the sacral cavity produced by removal of the rectum without allowing the soft tissues to fall into the cavity. In the female, the vagina and uterus fall backward, and the other structures are contracted toward the center from the lateral wall. In the male the prostate and seminal vesicles fall backward into the cavity, thereby reducing the space. With infection this cavity is somewhat fixed, thereby allowing a longer time for the filling in of fibrous tissue, collagen and contraction.

Attention to and correction of these factors as described, in my opinion, should have a great deal to do with the time required for healing of the perineal wound after proctocolectomy.

ZUSAMMENFASSUNG

Eine umfangreiche Mastdarmresektion kann zu Störungen der Geschlechtsfunktion führen, da diese durch Nerven des sympathischen und parasympathischen Systems geregelt wird. Durch sorgfältige Präparierung der Mastdarmwand kann die Durchtrennung dieser Nerven vermieden werden. Bei der perinealen Phase der Operation soll darauf geachtet werden, dass die Resektion so nahe wie irgend möglich am After erfolgt, und dass die Levatormuskeln möglichst nahe an der Vereinigung des Afters mit dem Rektum getrennt werden. Für die Heilung der perinealen Wunde sind ein normaler Hämoglobinspiegel und ein normales Blutvolum von höchster Wichtigkeit.

RÉSUMÉ

La fonction sexuelle normale étant contrôlée par des nerfs des systèmes autonome, sympathique et parasympathique, une large excision rectale peut avoir pour résultat une dysfonction sexuelle. Une dissection prudente de la paroi rectale prévient la section de ces nerfs. A la phase périnéale de l'opération, il faut prendre soin d'exciser aussi près que possible de l'anus, ainsi que de sectionner les muscles releveurs aussi près que possible de l'anus et du rectum. Un taux d'hémoglobine et un volume sanguin normaux sont d'une importance capitale pour la guérison des plaies périnéales.

RIASSUNTO

Poichè le funzioni sessuali sono di norma regolate dai nervi del sistema nervoso autonomo, simpatico e parasimpatico, la ampia exeresi del retto può causare disfunzioni sessuali. L'accuratezza nella dissezione della parete rettale può evitare la lesione di tali nervi. Durante la fase perineale della operazione si deve aver cura di incidere quanto più vicino all'ano sia possibile e così pure di sezionare gli elevatori dell'ano nel punto più vicino possibile al retto. Per la guarigione della ferita perineale riveste la massima importanza che il malato abbia un tasso di emoglobina e un vomume sanguigno normali.

RESUMEN

Toda vez que la función sexual normal está controlada por la inervación autónoma simpática y parasimpática la extirpación amplia del recto puede ir seguida de disfunción sexual. Puede evitarse la lesión de tales nervios mediante la disección muy cuidadosa de la pared rectal. Durante la fase perineal de la operación debe conducirse la disección lo mas próxima posible al ano y los músculos elevadores deben seccionarse en las proximadades del anorecto. Para conseguir una cicatrización rápida de la herida perineal son imprescindibles niveles normales de volumen hemático y de hemoglobina.

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Many persons might have attained to wisdom had they not assumed that they already possessed it.

—Seneca

One wise man's verdict outweighs all the fools'.

—Browning

Wisdom comes by disillusionment.

—Santayana

Intellect is invisible to the man who has none.

—Schopenhauer

If wise men were hairs, the world would need a wig.

—France

Editorials

Ancedotes from the History of Trephining

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THE practice of trephining the skull is a very ancient one. We know that in prehistoric times the medical practitioners trephined, or bored holes in the skull, for various purposes. The ancient Pharaohs were trephined shortly before death, so that their souls could leave their bodies and go up to heaven. We also know that the ancient Incas of Peru practiced trephining. When the French went into Morocco, they found men there performing this operation, and examination of evidence from the excavations of old ruined cities and cemeteries yields proof of the antiquity of the practice. The Peruvians were using flint instruments long after they had bronze, iron and steel at their disposal, which indicates that trephining had some religious significance and that the practice was very old indeed.

In the Peruvian Room at the International Surgeons' Hall of Fame in Chicago are representations of some of the ancient operations performed by the Incas. In Lima, Peru, one may see skulls that had been operated on (some of which had healed before death), as well as instruments, bandages, and medicines and drugs that the Peruvians used to prevent infection. Pottery jars excavated from graves near Lima depict operations. The Peruvians, like the Egyptians, made clay models representing all their activities, fired them, and then buried them in the graves with the dead. One pottery jar depicts a pre-Inca surgeon holding his patient firmly while trephining the skull. The patient naturally looks a little sad, but we know that he had a fair chance, as many patients survived this primitive procedure. A skull found by a French surgeon in Morocco had been used by trephiners to teach their disciples. It shows how they made holes, sawed through the skull, and then pried out the piece of bone. The skull had been taken from a cadaver and therefore shows no healing, but other skulls show that some patients did heal. In one skull the wound had healed at the opening; the bone had grown back and almost completely closed the orifice before the man finally died.

Trephining was practiced in Europe for a considerable time and well into the Middle Ages. An illustration taken from an Italian book written in the fourteenth century shows the physician standing off to one side telling his helpers what to do. In that century the physicians were learned men who would not dirty their hands with unpleasant tasks, so they called in the barber surgeon to do the actual work. In the picture is a man making a bandage and smearing some sort of antiseptic, or what he thinks is an antiseptic, on the patient, and another man is sterilizing

the bandage over the fire in a primitive way.

These operations, when performed in the Middle Ages, were mostly for head injuries. The injuries were generally the result of war wounds, of which there were many in those days. Such surgical treatment was also employed for mental illnesses. There was an epidemic of operations for headache in Holland and the other low countries in the sixteenth century. The surgeon would tell the patient he had stones in his head and that the stones caused the headache; he would offer to take the stones out, and the unfortunate patient would feel that the surgeon was really saving his life. This practice came to an end when such surgeons were exposed as quacks and could not make money any longer. Then Pasteur's discoveries led to the development of antiseptics, and Lister, in England, worked on the practical application of antiseptics to surgery. At this time surgeons began to operate not only on the skull but on the brain itself.

An early illustration by a surgeon named Fedor Krause shows an attempt to remove a tumor of the brain. He used a flask with a suction device to suck the tumor out of the brain. Though such a manner of operating is hardly advisable, things are still done today that resemble this early method. At that time, surgeons had begun to be interested in brain surgery but had not dared go into it; it was the advent of antiseptics that made possible the first real operations on the brain. The first surgeon who expressed real interest in the brain was a Frenchman named Chipault. I first heard of him when I went to France as a student in 1919, and I saw in the bookshops there a whole row of his books on brain surgery. Three of these volumes explained what had been done in various countries. Chipault interested people from all over the world in writing on this subject. I saw one volume on surgery of the spinal cord and six volumes of the first journal on neurosurgery to be published in the world. At the end of the sixth year of publication, however, these volumes came to a halt. I could not find anybody who knew anything about Chipault, and tried without success to find his obituary or other data about him. After I returned to the United States I became interested in collecting biographies and photographs and again tried to find out something about Chipault. All other sources failing, I wrote to my friend Petit-Dutaillis, professor of neurosurgery at the University of Paris, and asked for a photograph of Chipault. He wrote that

The editorial pages of the Journal of the International College of Surgeons *will continue to be honored by presentations of rare and extraordinary historic value, the lectures presented at the International Surgeons' Hall of Fame on medical and surgical history from the earliest recorded achievements to those of our own times. We believe that* Journal *readers who were not able to attend the lectures will find them as exciting as did the audiences present at their delivery. The story of progress in the healing arts and the giants of medicine and surgery to whom we owe the amazing brilliance and scope of modern achievements is intrinsically thrilling and is a vital part of the education of every cultivated man and woman, inside or outside the profession. It is altogether fitting that it should appear in these pages, since the International College of Surgeons is first, last and always a teaching institution.*

nobody had ever seen a photograph of this man or knew anything about him. I wrote again, saying that it was high time the French learned something about him, and that if he did not find me a photograph I would come to France and find it myself.

I do not know whether this threat had anything to do with it, but a couple of months later I received a photograph of Chipault. The first letter I received informed me that Chipault's wife was dead, that he had had a son who was a physician, now also deceased, and that none of them had had a photograph of him. When the photograph came it was accompanied by a second letter, explaining that Chipault had an illegitimate daughter and that this was her photograph of her father. Petit-Dutaillis learned a great deal more about the man from his daughter. The abrupt discontinuance of the neurologic journal, it seemed, was due to the fact that Chipault had acquired a disease of the spinal cord that left him paralyzed in both legs. He could no longer operate; he therefore withdrew from the medical world and went to live with his illegitimate daughter, who cared for him until his death. He died just before the first World War.

If Chipault had lived and had not had this unfortunate illness, he would undoubtedly have been the first great neurosurgeon in the world. He was performing operations principally on the skull and spine, rather than on the brain or the spinal cord. He performed operations in which he made artificial sutures in the skull so that the brain could expand. I have no doubt that he would have gone further with his work, because, at the time he died, serious surgical treatment of the brain had just begun.

A large tumor of the brain was removed by Keen, a surgeon in Philadelphia, at just about the time Chipault was at the height of his activities. It was a meningeal tumor affecting the dura mater, the hard outside covering of the brain. It was a large lump that penetrated into the brain but could easily be shelled out. This was the first type of tumor to be removed and is still the easiest to remove. If such a growth is removed successfully, the brain expands and fills the empty space, and the patient is well. The growth removed by Keen was the first brain tumor resected in the United States.

Keen had a colleague named Frazier, who, like most of his contemporaries, was not much of a neurologist. Nobody knew much about the nervous system at that time. At any rate, the surgeons knew less than the physicians did, so Frazier consulted a Philadelphia neurologist named Spiller, who advised him that there were various things he could do to stop pain. He could cut the root of the trigeminal nerve that transmits all sensation to the face. If this nerve were cut behind the ganglion, relief could be provided for the terrible facial pain called trigeminal neuralgia. Frazier performed this operation then, and it is still done in much the same way today, although some refinements have been added.

Spiller also explained that patients with pain in the lower extremities could be relieved if a certain tract in the spinal cord were cut. A surgeon named Martin performed the first operation of this kind, and Frazier did the rest. This operation is now done regularly; it is called cordotomy.

Meanwhile, the neurologists became somewhat disgusted with the surgeons and began to do their own operating. The first neurologist to become a brain surgeon was Pussep. He lived at Dorpat in Estonia, and at that time was working in Bechtereff's clinic in Leningrad. Bechtereff requested that he learn to operate on the nervous system, which he did. Magnus, working in Norway, also made contributions to these early studies of the nervous system.

In Germany a man named Foerster, a neurologist who began his career as a psychiatrist and worked with Wernicke, later became interested in the nervous system. During the first World War, when surgeons were all busy with war wounds, he could get no help, and so began working by himself.

Foerster was one of the greatest neurologists that ever lived. I spent one summer with him in his laboratory in Breslau. He had everything labeled, but the labels were so old nobody could read them, and he would not let anyone touch them. I did not know this, and when he put me into his little lab to study some tumors and spinal cords, I naturally, being curious, took some of the specimens down and was examining them at my desk when he came in. He asked, "Who took these specimens down?" The lab assistant said, very reluctantly, "Dr. Bailey." "Oh," said Foerster, and walked out. I put the specimens back and never touched them again.

That was not the only time I got into trouble with him. I lived with his mother and sister not far from the hospital, and his sister asked me if I would like to go to the mountains over the weekend. I said I would like that very much. So we went off to the mountains. On Sunday, which to the Professor was the same as any other day, he came in and asked, "Where is Dr. Bailey?" "I don't know," said the lab assistant. "He hasn't come this morning." "Well, is he sick?" "I don't know." "Well, why don't you know?" Then he went to the telephone and called his mother. "Why, Dr. Bailey went to the mountains with Angelica," she said. "The mountains?" he repeated, absolutely thunderstruck. He hung up the receiver, but when he got hold of Angelica he made her ears ring. "What do you mean by luring Dr. Bailey off to the mountains?" "I simply asked him if he would like to go, and he said yes," she replied. "Of course he said yes. He's a gentleman; what else could a gentleman say? But don't you dare take him away from his work again."

Angelica never did, which made me very happy. The moment we had reached those mountains, she had asked me if I wouldn't like to climb some little hills, and of course I said yes. Well, she was sixty-three years old and I ought to have been able to keep up with her, but she nearly killed me; she waltzed up that mountain without drawing an extra breath. I toiled after her. I was very happy indeed, thereafter, to go to the laboratory instead of the mountains.

These neurosurgeons were remarkable people in many ways. At that time Victor Horsley was an outstanding surgeon in England, and quite a good neurosurgeon. He was the first to remove a tumor of the spinal cord. During this initial operation he could not at first locate the tumor. Gowers, a physician observing the procedure, suggested that he look a little higher. He did so, found the tumor and removed it. It was fortunate that the physician was there, or the first tumor to be removed from the spinal cord would have been overlooked.

Victor Horsley was a remarkable man who had many peculiar ideas. He campaigned in England for women's suffrage, and went on such crusades every once in a while. He was terribly opposed to the smoking of tobacco—whiskey was all right, but tobacco was very bad. He berated his pupils and assistants continually for smoking. He violently hated the antivivisectionists. Every time an article against vivisection appeared in the London *Times*, he would write a vituperative answer. His friends enjoyed reading these at the breakfast table. One day a famous diplomat in the Foreign Office picked up the newspaper to see if it contained a letter by Horsley. Sure enough, there it was, blasting away at the antivivisectionists as usual. The diplomat read it, chuckling.

Then he came to the end and saw, to his amazement, his own name signed beneath it!

He called Horsley at once. "Victor," he said, "did you write that letter in the Times this morning?"

"Yes, of course. What did you think of it?"

"Never you mind what I think of it. What I want to know is why the devil my name is signed to it."

"Oh," said Horsley, "is that all? Why, I've written so many nobody pays any attention to me nowadays. I thought if I signed your name it might have some effect."

Horsley did many such things. At about that time surgeons became interested in stimulation of the brain. A German army surgeon named Fritsch, experimenting on animals, discovered that an electric current would stimulate the brain and make the animal's muscles move. All over the world, surgeons began to stimulate the brains of various animals in an attempt to learn where the motor cortex was. Horsley, of course, was also experimenting with this.

Meyers, a friend of Horsley's and a very important experimental psychologist, had been professor of psychology in Cairo, Egypt, and had there become interested in the peculiar psychology of the camel. Returning to England and the University of London, he brought a camel back with him. The camel had been comfortable enough in his natural Egyptian habitat, but in England Meyers had to build a heated house for him in his yard, and he had to import dates and other things to feed him. Naturally, as it cost him a good deal of money to keep the camel, Meyers was very careful about him.

One day, when Meyers was delivering a lecture at the University of London, Horsley rushed in. "Meyers! Meyers!" he cried, "the camel's dead!"

Meyers looked at him. "Victor," he said sternly, "have you been operating on that camel?"

"Of course," replied Horsley. "Who could do it better?"

"That's not the point, confound it," retorted Meyers. "The point is that that was *my* camel."

"You wouldn't have let me if I'd asked you first," Horsley pointed out calmly, "so I thought I'd operate first and tell you later. How was I to know the stupid brute would drink ether as if it were water? If he's dead, it's his own fault, not mine."

It was such incidents that often lost Horsley his friends.

When the first World War broke out Horsley was sent to Mesopotamia as an ordinary regimental surgeon, and died there in a way that might have been expected. He refused to wear a cork helmet, and so died of sunstroke. He was buried in a military cemetery there. A few years ago a friend of mine, a neurosurgeon in Iraq, paid a visit to Horsley's tomb. As he stood there, thinking of Horsley and all the stories that had been told about him, two Arabs suddenly came up to him, one on either side. "What are you doing here?" they inquired. "I am a brain surgeon," my friend replied. "This is the tomb of a famous English brain surgeon, and I was just paying my respects." "Oh," said one of the Arabs, "then that is all right. We are also brain surgeons. We belong to an ancient family of trephiners. This is a hereditary position here. Our family have been trephiners for eight or nine centuries." A highly interesting conversation followed, appropriately near the tomb of Victor Horsley.

Horsley was not much of a technical surgeon. He was very crude. He was a big man with enormous hands, and he was using a large rongeur; he would bang, bang, bang, and the chips would fly all over the operating room. He never both-

ered to put a bone back afterward. Nevertheless he was one of the first great neurosurgeons.

Surgeons soon began to worry about the hole left in the patient's head after the operation. The scalp sank in and left a soft spot. I remember that I once allowed one of my patients to go home without having had the bone put back. There was a tumor in the bone, and I thought I would let the patient recover a little before I filled in the gap with new bone. One day a friend of his, seeing him on the street, came up behind him, hit him genially on the head and said, "How are you, old fellow?" To his horror, the man fell, unconscious, and had to be brought back to the hospital in an ambulance.

Naturally, surgeons sought a way to avoid leaving these large soft spots in the head, and soon they came up with osteoplastic operations. The ideas were originally taken from Chipault's book, but it was Wagner, a German surgeon, who perfected the technic. He turned down a flap of temporal muscle so that the bone would grow together.

At first there was a great deal of difficulty with bleeding, and surgeons tried putting a rubber bandage around the head to act as a tourniquet. Of course, this procedure stopped the blood supply not only to the bone flap but to the rest of the scalp, and this sometimes caused complications.

Harvey Cushing was using this method when I became his pupil in 1919. I soon came to know him and his family well. One day I went to his home for tea, and Mrs. Cushing asked me if I had seen Sargent's portrait of Harvey. I said I had not, and she took me into the next room and showed it to me. My jaw dropped; I was tongue-tied and did not know what to say. Sargent had painted that mean look in Cushing's eye and that arrogant sneer of the lip that we students had seen only too often when we failed to come up to his fastidious expectations. Cushing had not liked the portrait and at first had refused to accept it, but Sargent, being a man of wealth in his own right, merely said, "Very well, you needn't take it; I'll keep it myself." They finally compromised. Sargent filled out the neck a little but refused to touch the face at all. When George Crile saw the picture he told Cushing he wanted it for the Library in Cleveland and wouldn't take no for an answer; and he got it. You can go to the library of the Institute of Medicine in Cleveland today and see this picture by Sargent.

It was not long before Cushing found a better way to control bleeding during an operation. Instead of putting the tourniquet around the head, he put it around the flap and so stopped bleeding from the flap. Bleeding from the outside of the incision was stopped by putting clamps on the edge of the wound and pinning them down. This pulled the periosteum over the edge of the wound. It was for such refinements that Harvey Cushing attained world-wide fame as a brain surgeon. He used a technic that had been taught him by Horsley, that is, the technic of sewing up the wound slowly and painstakingly with ordinary cambric needles. After the operation was completed, it was sometimes very difficult to see where the incisions had been made.

Another thing that disturbed surgeons in that era was the fact that when they sawed into the holes they had made, the saw would sometimes cut the dura mater underneath. They invented more suitable saws, and finally an Italian surgeon named Gigli invented the flexible saw. That was the saw that is almost always used today.

II

One of the principal necessities of the surgeon is that he be able to see what he is doing. Naturally, if the light shines down into the wound and his head is in

the way, he will not be able to see. When I first went to Foerster's clinic, he had an assistant who held the light for him. The light was of the type used by mechanics working under automobiles; it had a shield around it and hung from the end of a stick. If the assistant moved it near the wound Foerster couldn't see, and if he moved it away the result, naturally, was darkness. There was continual quarreling between Foerster and his assistant about that light. "Leuchten mir! Sie leuchten mir nicht!"* Foerster would shout at the baffled young man. One day I had to hold that light myself, and I never went near the operating room again. It was better for both of us that I stayed away.

The light used by Cushing was an ordinary 110-volt electric lamp. It was always in his and everyone else's way, and he was continually burning someone's hands or forehead with it.

When I first came to Chicago I was using the same lamp that Cushing used. One very hot day, before they had air conditioning at the University of Chicago, I was in the operating room and perspiring from every pore. I could not see well, so I told the nurse to put the lamp on my head. She did this, and, in order to keep the cord from falling into the wound, she pinned it behind with a safety pin; but, instead of putting the pin around the cord, she put it *through* the cord. The shock knocked me to the floor and gave me convulsions. This story will help to explain my subsequent eccentricities to those of my students who have wondered about them.

My shoulders and neck were black for weeks after that experience. I decided that something would have to be done about the problem of lighting, so I invented my own lamp. This one has an ordinary 6-volt automobile headlamp bulb. The light strikes a mirror and is projected directly into the line of vision. The lamp does not project over the surgeon's or his assistant's face.

Such details are very important, and a great deal of the world's progress can be attributed to the invention of gadgets. Here is an example: When I first came to Chicago, I was Harvey Cushing's faithful disciple, operating with the same tools he had used. One day, while I was operating, the trephine fell into the patient's head. That had never happened to me before, and it was anything but pleasant. It did not do the patient any real harm, but it might have. That night I lay awake thinking about the problem. The obvious thing to do, I decided, was to alter the trephine in some way so that it *could* not fall into the wound. If a pin, longer than the diameter of the hole in the skull, were put across the trephine, the trephine, if it fell, would fall only as far as the pin permitted. At the first opportunity I told Paul Bucy, my assistant at that time, to go to the shop and put a pin through my trephine. He was much excited by this idea and said, "That's wonderful. We ought to write that up and present it to the Surgical Society."

"Somebody has certainly thought of it before," I replied. He demurred, "I've looked through all the books, and nobody has ever done such a thing before as far as I can determine." I then went to the library and found a surgical treatise containing an illustration by Andrea a Cruce. This picture showed a trephine that had not only one pin, but three of them. Such an instrument could be used effectively on a head of any size or shape. There is not really much that is new under the sun. Somebody will think of it again in fifty years or so and will become famous for his "discovery."

I suppose the most famous surgeon of my acquaintance was Clovis Vincent, whom I knew in France. Vincent was a

*"Light me! You do not light me!"

neurologist and a favorite pupil of Babinski's. He had never operated and had no intention of doing so. At that time Babinski sent his patients for operation to Thierry de Martel de Janville, who was a direct descendant of Mirabeau and therefore an aristocrat and sublimely aware of it; his superiority was as obvious to him as the sun and moon to an artist, and in his opinion it ought to have been equally obvious to everybody. De Martel had immense self-confidence. While still an intern he invented a trephine that could not fall into the wound. This trephine had a movable pin on one side, which rested against the outside of the skull. As the trephine went deeper, the pin receded further; thus the trephine was constantly under control. When the trephine had gone through the bone and there was no more pressure on it, it detached itself and would not turn around any more. This was the famous de Martel trephine.

He was obviously a very precocious young man—more precocious than prudent. He took his trephine to the surgical society and presented it there. It was criticized adversely by the professor of surgery, and when the instrument was discussed adversely at the presentation, de Martel remarked that the trouble with the professor of surgery was that he (de Martel) could trephine the skull in less time than it took the professor to understand the mechanism. It is easy to see why de Martel got no further with his academic career in Paris and why he never became a professor. He did not care, however; he was a wealthy man and could afford to build his own hospital and operate there. Babinski remained his good friend and sent him patients for operations. When Babinski died, Vincent, his favorite pupil, took over his practice and, as he was also a friend of de Martel's, continued to send them.

One day de Martel said to Vincent, "Clovis, I am going over to the American College of Surgeons in Philadelphia. You'd better come along."

"Oh, no," said Vincent, "I haven't the time; I am too busy here."

"But you ought to take time. You ought to come with me and see how they perform surgery of the brain in the United States."

Vincent shook his head. "That's your business. I am not a surgeon. Besides, I can't speak English; I wouldn't know what was going on."

"Nonsense," said de Martel, "that will be all right. Bailey will be there."

"Oh," said Vincent, and paused. "Well, then, if Bailey is going to be there, I will come."

So both of them came, not only to the College meeting but to a clinic of Cushing's in Boston. Dr. Cushing had many patients from whom he had removed small cerebellar tumors, and he was showing them one after another. At first the two Frenchmen fidgeted and talked to each other and did not pay too much attention. Suddenly Vincent sat up and looked at one of the patients, and then scrutinized carefully the next one that came in. Turning to de Martel, he demanded, "Why haven't they got hernias in the back of their necks?"

"Oh, that's a surgical matter," said de Martel, "don't bother me with such questions."

Vincent was piqued. "You told me to come here and learn how they perform surgery of the brain in the United States. I want to know why those patients haven't got hernias in the backs of their necks."

I knew what was coming. I knew there would be trouble, because de Martel said, "Ask Bailey afterward, and he will tell you."

Later, accordingly, Vincent came up to me and asked, "Why don't these patients have hernias in the backs of their necks?"

I had to tell him the truth, because I knew he would find out anyway; so I ex-

plained to him that there were no hernias because the wounds had been properly closed. "After de Martel has removed a tumor," I added, "he remembers he has half a dozen gastrectomies and two or three other operations to do, so he doesn't trouble himself about proper closure."

"Aha, c'est ca."* Vincent smiled.

After that, Vincent did not miss anything. When they returned to France, de Martel's first operation was a tumor extraction. After he had removed the tumor, he began sewing up the wound with catgut sutures. "Oh, no," said Vincent. "That's not the way to sew up a wound."

De Martel snorted. "What do you know about surgery? You are not a surgeon."

"No, but that is not the way they do it in the United States," Vincent replied.

"This is France," de Martel retorted, "not the United States."

"Yes, but you told me to go to the United States to learn about surgery of the brain, and they don't do things that way in the United States."

"Well," said de Martel, "if you know so much about it, suppose you sew up the wound."

Vincent immediately scrubbed up. He was fifty years old and had not performed an operation since his internship and very few of them then. Nevertheless, he sewed up the wound successfully.

Soon this procedure became routine to the two men. De Martel would remove the tumor, and Vincent would sew up the wound. One day de Martel was late and the patient was in bad condition. Vincent, who was always nervous anyway, kept pacing the floor and muttering, "Oh, what shall we do, what shall we do?" Finally he exclaimed, "Well, if I can sew up a wound I can open one." He scrubbed up and began the operation, and in came de Martel.

"Clovis! What are you doing?" he cried.

"I am operating," Vincent said calmly.

"I see you are, but you are not a surgeon. Moreover, this is my operating room."

"And this is my patient," said Vincent, "and you were not here."

De Martel drew himself up and insulted Vincent unforgivably. "Mais c'est moi, le seigneur!"**

Vincent told me about this afterward, adding "That was why we fought the Revolution. There are no more 'seigneurs.' I want nothing to do with this man hereafter." And after that, every time I went to Paris, each of them tried to buttonhole me and tell me his side of the story.

Before I had learned any of the circumstances of this quarrel, I had received a cablegram from Vincent saying tersely, "I am arriving soon with two pupils." That was all. He brought his two pupils, Puech and David, to Chicago. He had decided to become a brain surgeon, and he was serious about it. The two pupils made my life perfectly miserable during the three months they lived with me. Night and day they asked questions, questions, questions. I had never been through such a grilling in my life. At the end of three months they went home and began operating in a private clinic. They took patients there and paid all their expenses themselves. De Martel became terribly worried about it. He was ashamed, since Vincent had been his lifelong friend. He made a special trip to Chicago to talk to me about the situation. I told him he could do nothing about it. I said, "You know the man is going to operate, and the best thing to do is try to see that he does no particular harm, and that other people let him alone and don't interfere with him."

De Martel was big-hearted enough to agree. When he went home, he found that

*"Aha, so that's it!"

**"But I am the patrician!"

the surgeons had already gathered their guns and were preparing to do something about Vincent; but de Martel defended him, and friends in the Ministry saw to it that Vincent was allowed to operate but built him an operating room in his medical clinic. After that, Vincent really established modern brain surgery in France.

During the war he got into trouble for hiding American aviators. He put bandages on their heads and kept them. One foolish boy, however, crawled out the window one night, went to Montmartre, got drunk, and was picked up by the Gestapo. He told everything he knew. The Germans took Vincent to the police station, but he was protected by the Surgeon General of the German Army, a man named Wilhelm Tönnis. Tönnis was also a friend of mine; he is now professor of neurosurgery at Köln University. He induced the Germans to let Vincent go, and they allowed him to return to practice, provided he would agree not to hide any more aviators.

De Martel and Vincent each used to bring patients to the neurologic society and present them there. They became great rivals, constantly trying to outdo each other in this way. One day Vincent brought a patient who had undergone an operation for a tumor of what is called Rathke's pouch. This pouch was filled with cotton like a little ball. Vincent's patient marched in holding the little ball in his hand. Vincent said, "Gentlemen, please observe that this patient walks into the room with his pocket in his hand." This incident made de Martel angry, for he assumed that Vincent wanted the audience to think that he, de Martel, had never accomplished the like. The French *esprit* sprang to arms. De Martel had two patients outside, upon whom he had operated for tumors. A cerebellar tumor causes disturbances of equilibrium, so that the patient walks with his legs far apart in order to increase the support of his torso. De Martel had his patients walk in. "Gentlemen," he said, "Vincent has shown you two patients with their pockets in their hands. Please observe that my patients come in with their hands in their pockets."

Of course, the French audience roared; they like nothing better than a little *jeu d'esprit* of that sort. They had some difficulty in keeping the two surgeons from fighting a duel, but they finally persuaded both to settle down. Neither of them, however, was allowed to attend the meetings after that. Vincent died soon after, as a result of cerebral hemorrhage, and de Martel committed suicide, when the Germans marched into Paris, by injecting a huge dose of strychnine intravenously.

To leave France and consider the events of the present day in America, it is well known that Americans are addicted to gadgets. Even gadgets, of course, are necessary, but there is a tendency here to increase the number unnecessarily. Americans want electric trephines and knives; everything must be either electric or atomic. Personally, I prefer hand instruments. I have many elaborate gadgets but rarely use them, and they are rarely used in the Psychiatric Institute of the State of Illinois.

Some surgeons, of course, play to the grandstand, bidding for—and getting—cheers from everybody in the vicinity. Such surgeons may throw instruments around the room, shout at their assistants and make a great display. An illustration drawn by the artist Artzybasheff depicts brain surgery in a mental clinic. We don't dig things out of the subconscious in exactly that way, but we do sometimes operate for mental disease. Such an operation—it is called lobotomy—was first performed in Lisbon, Portugal, by Línia. This operation was in great vogue for some time, as many operations are, but

has now been almost completely given up.

I fear I have told more yarns than facts about neurosurgery. I hope, however, that I have made some of the great men in this field live in your imagination and memory. They have done a great deal for humanity. The field is now so well established that there are now about 500 brain surgeons in the United States; when I began, there were only five. Like everything else in this country, the list grows bigger and bigger as time goes on.

In order to make the solution of a scientific problem at all likely, it is advisable to eliminate as many variables as possible. The significance of this plainly obvious fact is far more widespread than may be at first apparent. A disregard of its principles enters into the attempt to arrive at a conclusion to all the social problems which I ever hear discussed. For instance, at a little luncheon gathering where I am frequently present, one of the members is by profession a psychiatrist. He not infrequently returns to our midst fresh from the pursuit of his dreadful duties, which are to explain to a jury that, in his opinion, a man who has cleft a business associate over the head with a meat ax is mentally somewhat unbalanced. His reappearance immediately provokes an extremely heated argument on the ancient subject of capital punishment, and invariably it may be observed that no two entrants to the debate are talking about the same thing. My psychiatrist friend is interested only in the scientific problem presented; he aims to classify his specimen and study the causes of his malady; to hang him would interrupt a beautiful natural experiment. A novelist member appears to agree with the alienist, but he does not agree at all, because he is opposed to hanging the man for the sentimental reason that the soul torture involved revolts all his sensibilities. And a sociologist is moved to discuss the matter upon a totally different basis, which is the effect on society and other potential murderers of either hanging or not hanging the victim. But they all think they are discussing the same question.

—*Clendening*

The Influence of Italian Medicine on Surgery

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THOSE WHO MOST influenced the progress of Italian medicine and surgery were Hippocrates, the "father of medicine," Vesalius and Leonardo da Vinci.

Hippocrates (circa 460-361 B.C.) was a physician's son. His sons and grandsons were also physicians. He was a scientific physician, basing his studies upon seeking the diagnosis, and he placed great importance on the progress of a disease. He wrote many manuscripts covering a wide range of subjects, including medicine and surgery. The oath of Hippocrates is well known to all graduates in medicine. He propounded a theory of the origin of disease, "humoral pathology," which has long been discarded, although we still have what are known as serodiagnosis and serotherapy.

Claudius Galenus (circa 131-200 A.D.) was not an Italian by birth. He was born in Asia Minor, and, according to history, he probably died in Sicily. He was a writer, researcher and diagnostician. His teaching dominated Western medicine for fifteen hundred years. He was a profound student, having devoted ten years to traveling in order to gain medical instruction from the foremost physicians of his time. He was the founder of experimental medicine, but not without handicaps; he was greatly frustrated because he was not allowed to dissect as many human bodies as he desired. He was the first to describe the cranial nerves and the sympathetic nervous system.

Andreas Vesalius (1514-1564) was not a native Italian. He was an anatomist and obtained his medical education in the schools of Louvain and Paris. In order to satisfy his demands for knowledge of anatomy he took the prisoners who were executed. His dissections were drawn by the Flemish painter, Stefan Calcar, who was a pupil of Titian. Vesalius had a violent temper and as a result harbored many differences and jealousies. He was accepted as court physician to Emperor Charles V, and his son, King Philip II of Spain, and was instructor at the University of Padua from 1537 to 1546. The publication of his book in 1543 established anatomy as we know it today.

Leonardo da Vinci was not a physician, but he contributed much at the end of the fifteenth century toward inauguration of the Renaissance in medicine. His anatomic studies represented a great advance. He was an immensely versatile man, being a painter, mathematician, philosopher, biologist, botanist and inventor, and he made many helpful contributions to medicine. He did not subscribe to the teachings of Galen. His books on anatomy, numbering one hundred and twenty, also included valuable material on physiology. His research in anatomy developed the concept of circulation in the veins. He described accurately the bones, the brain and the problems of circulation. He is best known for two of his paintings, *Mona Lisa* and *The Last Supper*. Even in his great era as an artist he drew models which today, with slight alterations, could be used for airplanes or gliders. He created models of the machine gun, friction transmission, boats and other inventions too numerous to mention.

The Renaissance in the sixteenth century in Italy took its origin primarily from Leonardo's anatomic studies, for he

was far ahead of the times. His disregard of the teachings of Galen and Mondino accounts for much of his success. Most of his manuscripts are in the Royal Library of Windsor Castle; some are in Paris and others in Turin. He was credited with dissecting thirty cadavers, ten for study of the veins alone. He injected liquid wax into the veins and made serial sections. He also studied the embryos of animals and the fetus *in utero*. He presented the first accurate account of reproduction in the uterus. He described the fetal membranes. He studied the muscles, the bones, the brain and the anatomic nature of the cerebral nerves; as well as respiration and circulation. He made injections into the bovine heart and studied the ventricles. He was the first to attack the problem of human anatomy with unbiased judgment.

In addition to these pioneers, the impetus given to Italian surgery was due mainly to the establishment and organization of several universities in the thirteenth and fourteenth centuries. It is agreed that the basis of surgery was the profound knowledge of anatomy available at the universities of Bologna, Salerno and Padua, founded in 1203 by Frederick II. The great William Harvey (1571-1593) studied anatomy in Padua in the early centuries of the Middle Ages. Medicine was practiced by the clergy, and the medical students obtained their information in the convents, but the one important school of medicine was located in Salerno and founded by the Benedictine monks. The school acquired a great reputation, and students from everywhere came to Salerno for their education. With these facilities and the contributions of some noted physicians, such as Gariopontis, Petrus Clericus and a woman named Trotula, this was considered "the first period in medicine" at the University of Salerno. The second period was greatly influenced by Arabian physicians, and Constantinus Africanus became a celebrated practitioner and preceptor.

Anatomy was the most important subject taught at Salerno. There is some evidence that trephining of the skull and abdominal operations were performed. Operation for carinoma of the rectum and the uterus were performed, but the results were so bad the operation was not universally recommended. Frederich II of Sicily and Charles I of Augu were prime movers in the organizations of the University of Salerno.

The Jewish physicians were active in Salerno as early as the ninth century. There were many restriction against Jews in business and political pursuits. This influenced them greatly in the choice of a profession; many studied medicine and law for this reason. Prominent Jewish physicians were Faradsh ben Solomo Moses (of Palermo) and Sabbatai Domnolo.

Despite the fine reputation of the university established at Salerno, it was superseded by the University of Bologna. Here also the teaching of anatomy was the most important subject. Taddeo Alderotti taught there from 1260 on and was rated the most illustrious practicing physician of his time. He was a follower of the teachings of Hippocrates. The fame of the school at Bologna was augmented by the progress in the field of surgery made by two physicians, Hugh and Theodoric Borgognone. Although the latter preceded Lord Lister of England by many years, he also observed that pus was not necessary to the healing of wounds and that, instead, it delayed healing. He was also the first to apply antiseptics to wounds, using wine to obtain rapid healing. He also used sponges saturated with a narcotic substance for anesthesia during operation. In the anatomic field the greatest physician and surgeon of Bologna was William of Saliceto (1210-1280), who advocated the use of the knife instead of

the hot iron, which was then universally employed by surgeons. The prejudice of the Church against shedding blood made the practice of surgery extremely difficult.

The teachings of Galen were replaced by new studies in the school of anatomy, which gave the school of Bologna a tremendous reputation. It became known that Italians were fine anatomists, and scientific surgical practice originated from their studies. The world's best teachers of anatomy were at the universities of Bologna and Padua.

The advance in anatomic studies was developed by Leonardo da Vinci. Dissections were performed exclusively on animals, by the surgeon or his assistant. The first teacher of anatomy in the school of Bologna was Mondino de Luzzi. His book was published in 1478 and became the textbook in all Italian schools up to the time of Vesalius.

In the twelfth century the teaching of women could be performed only by women. (This practice continues today in the Middle East.) Women and children were examined by female physicians only, which accounts for the large number of such physicians in the Middle Eastern nations.

In the twelfth century the teaching of surgery was conducted by barbers and other uneducated persons. At the end of the fifteenth century Alexander Achilini corrected certain errors of Galen, whose teachings had been adhered to for a thousand years. Achilini studied carefully the bladder, the cecum and the bile ducts and first described the formation of the cerebral nerves. Alexander Benedetti (1460-1525) performed autopsies to determine the cause of death.

Gabriel Fallopio (1523-1562), the great Italian anatomist of the sixteenth century, taught at Pisa and Padua, disagreeing with Galen even more strongly than did Vesalius. He corrected many of the teachings of Vesalius concerning the cerebral arteries and the clitoris. He also described the tubes that bear his name, the oculomotor nerves, the cerebral nerves, the chorda tympani and the semicircular canal. The first edition of his *Observations of Anatomy* was published in 1651.

Geromao Gabrizio de Aquapendente (1539-1610) created the anatomic theater of Padua, which is still in existence. Padua became a fine medical center. Bartolomeo Eustacchio (1520-1574) discovered the tubes that bear his name. Constanzo Varolio (1543-1575) made important anatomic studies of the brain and discovered the pons Varoli.

Physiologic studies took root in Italy with the Renaissance. Many anatomic studies of the circulation were done by Realdo Columbo, professor of anatomy at Padua, who cleared up problems concerning the circulation from one ventricle to the other. He also stated that the pulmonary vein carried blood and not air. Fabricius of Aquapendente, the teacher of Harvey at Padua, described the venous valves. The actual manner of circulation of the blood, of course, was first described completely and accurately by Harvey.

Italian surgery made great progress in the sixteenth century. Mariano Santo da Barletti recommended the lateral incision for lithotomy. In 1573 Giovanni Antonio della Croce published a book, that was considered the classic textbook in surgery for more than two centuries. Another Italian surgeon of renown was Leonardo Botalla of Asti, born in 1530, and still another should be mentioned—Guido Guidi. His name is associated with the vidian nerve and canal, which he described.

Plastic surgery obtained an outstanding exponent in Gaspari Tagliocozzi (1546-1599). Illustrations of the Tagliocozzi operation are familiar to all surgeons. Rhinoplasty had been practiced in Sicily and Calabria since 1400. Arabian and Indian surgeons probably brought it there.

Tagliocozzi was the first to perform rhinoplasty on an anatomic basis, taking a piece of the skin of the arm and binding it to the nose until it had become adapted to its new situation.

The discovery of the microscope by Galilieo (1610) was an important aid in establishing a diagnosis. Marcello Malpighi (1628-1694) was the first great medical scientist to use the microscope. His studies in human physiology led to the discovery of the capillaries and blood corpuscles and the glomeruli of the kidney. These studies were continued by Lorenzo Bellini (1643-1714) and by Antonio Maria Valsalva, who was considered the pioneer student of the anatomic character of the ear. Antonio Pacchione (1665-1726) was concerned with the anatomic nature and function of the dura mater and described the bodies that bear his name.

The eighteenth century was concerned with physiology and pathology. Normal and pathologic anatomic conditions were studied, the master worker being Giovanni Batista Morgagni (1682-1771), who is considered the founder of modern pathologic anatomy. Pupils of Morgagni were Mascagni, whose work on the lymphatics was outstanding, and Antonio Scarpa (1752-1832), who was an anatomist and surgeon of great reputation. During this century Italy maintained the traditions of the great surgical schools. One of the best surgeons practicing at this time was Giuseppe Flaiani (1741-1801). He was an anatomist and the founder of the museum at the hospital of Santo Spirito in Rome. He was most skillful in performing lithotomy and was the head of the surgical school at Rome. To Flaiani must be given credit for the discovery of exophthalmic goiter, in conjunction with Pari, Graves and Basedow. In the same century it was impressed on the profession that anatomic and pathologic studies constitute the basis of every modern study. Anatomy had written the history of the Renaissance in the fourteenth century and dictated the laws of the schools of Padua and Bologna. Pathologic anatomy began with Morgagni, whose example and teaching initiated a new era of medicine.

Little progress was made in the early part of the nineteenth century, owing to the French Revolution and the Napoleonic wars. Morgagni and Spallanzani had considerable influence in developing medical thought in Italy. In the first half of the nineteenth century Italy did not maintain her position in the advancement of science. Anatomy was still the most important subject.

Bartolomeo Panizza (1782-1867) was professor at Pavia and founded the anatomic museum. He made important studies of lymphatic vessels and located the center of vision in the brain. Another great Italian anatomist was Luigi Rolando (1773-1831), professor of anatomy at Turin, who made important studies of the structure of the human brain and spinal cord. All surgeons are familiar with the region of Rolando.

Surgery prospered especially at Pisa, where Berlinghieri (1772-1826) flourished, and at Padua, where Tito Vanzetti (1809-1888) performed ovariotomy in 1848.

Francesco Rizzoli of Bologna (1809-1880) was called the father of modern orthopedics, and Fernando Palasciano (1815-1891), in Naples, performed trephination of the skull for cerebral tumor. He was also the first proponent of the idea of establishing the Red Cross, maintaining that it was necessary to treat the wounded no matter what army they belonged to. For his actions during the siege of Messina he was condemned to a year in prison.

In the middle of the nineteenth century some excellent surgeons and research workers influenced the progress of medicine and surgery in Italy. Sarcoma was described about the middle of the century.

Guido Banti (1852), a professor at Florence, was the first to describe the form of splenic anemia that bears his name. Carlo Forlanini (1847-1918) first proposed artificial pneumothorax for the treatment of pulmonary tuberculosis in 1882.

Italian surgery developed greatly in the second half of the nineteenth century as compared to the first half. Surgical schools were founded in all the great universities. Francesco Durante, born in 1844, performed resections of the elbow and of the larynx. An important clinic in Rome was directed by Prof. Raffaele Bastianelli. I attended Prof. Bastianelli's clinic in 1925, held in the Polyclinic Hospital in Rome. He performed a hysterectomy with skill, good judgment and fine technic. At an earlier meeting of the International College of Surgeons in Rome I was his guest, with a number of other surgeons.

The University of Padua Surgical School was founded by Edoardo Bassini (1847-1924). His operation for hernia was universally adopted. He was also one of the first to do an ileocecal resection. Giuseppe Corradi, born in 1830, wrote important articles on surgical treatment of the blood vessels and bones. He applied an elastic ligature to the liver before resection; he also invented an enterotomy for internal obstruction. Antonio Carle was noted for his studies on cerebral and gastric surgery. Marie Donati succeeded him, occupying the chair at Turin. The most illustrious clinician at the University of Naples was Antonio de'Antena (1842-1914). In 1885 he performed a paraperitoneal nephrectomy. The school of Pisa was represented by Antonio Ceci (1852). In Bologna, Giuseppe Ruggi (1884) published a paper on one thousand successful laparotomies.

One of the most important schools was founded by Baldo Rusi in Milan, where surgery and pathology were placed on a high plane. Among the Italian surgeons of our time, the late Raffaele Paolucci (1892-1958) was a master. He was director of the surgical clinics at Parma and Bologna. He was a pioneer in thoracic surgery, and later he specialized in cardiovascular surgery. He profoundly believed that the International College of Surgeons was an important organization to help maintain the peace of the world. Unfortunately, he died while he was President of the Italian Section. He had been scheduled to preside at the Rome meeting. In World War I he was awarded the Gold Medal of Military Valor by Italy and the Distinguished Service Medal by the United States for his bravery in effecting the sinking of a flagship of the Austrian fleet.

Edoardo Porro (1842-1902) taught obstetrics and gynecology at the University of Parva. His name is indelibly connected with the technic of the Porro cesarean section. In orthopedics, Francesco Rizzoli (1809-1880) founded the Rizzoli Clinic of the University of Bologna. Antonio Paci (1845-1902), together with the famous Dr. Lorenz, invented a method to reduce congenital dislocation of the hip. Two great modern orthopedic surgeons were Alessandro Corivilla (1861-1912) and his famous pupil Vittoro Putti, who became director of the Orthopedic Clinic of the Institute Rizzolo of Bologna. They placed the specialty of orthopedic surgery on a high level.

The Hall of Fame in Chicago was founded, through the efforts of the late Max Thorek and Mrs. Thorek, to commemorate physicians who have achieved eminence in their specialties and who have been dead at least fifteen years. The Hall was formerly the private home of a millionaire. It is wonderfully built and ideal for the purposes to which it has been assigned. The exterior is of stone, and the interior has woodwork of a quality that cannot be duplicated today. In the Hall of Fame are separate rooms allotted to vari-

ous nations throughout the world. These rooms are furnished with displays of books and instruments used by pioneer surgeons. In the room assigned to Italy will be found writings of Vesalius and Morgagni. Here will also be found a model of the Amphitheater in the University of Padua (1594); there are no seats in this theater, and all students listening to lectures must stand. Italian surgeons' instruments of the first century A.D. are displayed.

Italy has contributed to the learning of posterity by furnishing a room in the Hall of Frame. A trocar and cannula for the relief of ascites, as well as curettes and vaginal speculums, are shown. On a tablet in this room are the names of thirty prominent Italian surgeons and physicians. The most valuable documents displayed are the first prints of Fabricia and Morgagni.

The countries represented in the Hall of Fame and furnished by them are: Argentina, Australia, Brazil, British Commonwealth, China, Colombia, Cuba, France, Germany, Greece, India, Israel, Italy, Japan, Mexico, The Netherlands, Peru, Spain, the United States and Venezuela.

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Longius affirms that a lady in Cologne, who was in that state that ladies wish to be who love their lords, took such a fancy to taste the flesh of her husband that she actually assassinated him, and, after indulging in as much fresh meat as the weather permitted, salted the remainder for further use. This cannibal inclination seems not to be uncommon. The said Roderic à Castro knew a woman in the same thriving condition, who felt an inexpressible desire for a bit of the shoulder of a neighbouring baker, and her husband was persecuted by her constant prayers and lamentations to prevail on the worthy man to allow her one bite for charity's sake: but the first bite was so heartily inflicted, that the crusty baker would not submit to a second.

—*Millingen* (circa 1839)

The Surgeon's Personality

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PERSONALITY is a blending of human qualities. As light, transparent and illuminating, is a blending of the colors of the spectrum, the personality of the surgeon is a blend of skills, attitudes and technical abilities on which the effectiveness of his work depends. The surgeon who displays aptitude for his work, according to Moynihan, has "the heart of a lion, the eye of an eagle and the hand of a woman." In his approach he displays aggressiveness yet gentleness, dispatch yet meticulousness, confidence with caution, alertness as to conditions of the present with an imaginative foresight of the effect of his surgical action on the postoperative course of the patient.

The most dramatic activity of the surgeon is the performance of the surgical operation. It is an important event in the life of the patient; his future existence, comfort, function and well-being may depend on it. It is an important event in the work of the surgeon; his reputation, professional satisfaction and peace of mind depend on his performance of it. Culture and civilization, which have perfected the sciences that uphold medicine and surgery, have also brought the state of training and the personality of the surgeon to such levels that he may pursue this healing art with the highest ideals for the betterment of life. In appraising those worthy to be trusted with surgical management, it is well to consider the personality. In time, principles may be established for the selection of persons whose innate character is distinguished by qualities that may be fully developed into the highest surgical skill.

Surgical skill is a physical performance involving the heart and mind as well as the hands. The mind must be enriched with the knowledge of the past as well as aware of the work of contemporary leaders before the principles of surgical science can be fully understood. The heart must also be involved in order to establish unimpeachable indications for surgery. For honest application of surgical therapy the surgeon must be permanently wedded to the Golden Rule. Cleverness is desirable for the solution of surgical problems, but cleverness alone will not suffice, for a crafty character combined with unconscious egoistic motives can lead one to perform unnecessary operations. If the preoperative indications are sound and solid, the surgeon's training adequate and the appurtenances of the modern hospital available, the excellence of the operation will depend entirely on the surgeon's personality. In a good hospital the atmosphere will be free from pressures that may upset his judgment, and he himself must be capable of facing, resisting and overcoming undue pressure, whether it is the result of man-made or of God-made situations.

The qualities of a skilled surgeon should be definable and measurable. Whether these qualities can be developed to the full in any given person should be ascertainable beforehand by means of aptitude tests. Although the validity of such aptitude tests is variable, the concept is still credible. Aptitude studies proceed best on an entirely voluntary basis. It is a truism that humanity makes the greatest progress in a free society, and any craft or profession can advance farthest if those

who represent it insist on freedom of choice.

There may be many intangibles in the measurement of a man that accepted measuring processes do not recognize. For example, it has been shown that a great epic in maritime history, involving a single long-time survivor at sea in a small boat, concerned a person who had been refused admission to the Navy on the basis of inadequate physical requirements. The measurement of a man is one of the most difficult things to standardize, but it should be done to the extent that it is possible, with emphasis on the man himself. It is probably more important to determine what a man is and what he can do than to estimate his competence on the sole basis of where he has been, what he has seen and the amount of formal training he has undergone.

The personality of the surgeon is a product of his heredity, his environment, the cultural background within which he has developed, and his special training. The cultural pattern of society, as well as his association with other surgeons, produces his habits, opinions, standards, tastes, beliefs, emotions and values. Comradeship with other men dedicated to this calling helps him to master its higher standards in terms of practice, technic and the ethical purpose. The *ne plus ultra* of the surgeon is the achievement of poise, a quality of "relaxed rigidity." It implies the readiness to react with maximum efficiency and the ability to do so at the right time.

The physical demands of surgical craft were obvious even in the barber-surgeons' era. Their employment by physicians for the relief of human misery depended on their quickness and sureness with a knife. The rank of a barber-surgeon produced an obligatory humility; his regular craft sharpened his technical cunning and cleverness. Surgeons in England jealously guard the "Mr." that represents the historical dedication to this specialty of medicine, and surgical history goes back to a time when there was no anesthesia to palliate the pain inflicted by the surgeon's knife. It required sureness, imagination, anatomic knowledge and dexterity to achieve the desired result. Traditionally, quickness and deftness have been the surgeon's oustanding qualities, and a natural endowment of both is desirable to one who pursues this calling. The use of sharp steel has always called for orientation, timing and quickness to preserve life. The brilliant speed of Halstead was converted into painstaking and gentle meticulousness with living tissue, and ushered in a new era in surgery. A diligent and deliberate attitude, combined with dispatch, differs widely from dilatory dawdling at a slack pace. Every advance in surgical knowledge must be applied, balanced always with a sound, sure sense of proportion.

And every advance in surgery must take the learning of the past as a starting point. The ability to learn is an outstanding necessity to the physician. This is the characteristic that distinguishes men from other creatures; society, culture and civilization have arisen from it. Learning has been transmitted from one generation to another through the medium of language, stored in regional folklore and in libraries all over the world. Man's ability to learn accounts for his adaptability. As the body of knowledge has increased, the patterns of culture have changed and advanced all science. In the past, advancement of human knowledge has been based on concepts by a few such historic figures as Aristotle, John Hunter, DaVinci or Pasteur. Nowadays the learning and temperament of every physician or surgeon should enable him to add a brick to the edifice of scientific knowledge; but his learning must not only be not that of his craft alone, but of all that concerns human life. He must have a full proportionate

realization of the place of the healing art in human life if he is to be the perpetuator of the knowledge of the past and the apt and able pupil of the future.

To be susceptible and receptive to the learning of the past, a man requires an open mind, free from bias and prejudice. The plasticity of behavior that characterizes man's adaptability should accompany the intellectual qualities of the surgeon, who can draw the best from all cultures. Nor is this all, for his obligation as a surgeon continues with the duty to transmit the fruits of his experience to the younger devotees of his calling, so that the standards of his art may continue at a high level of application. The obligation of a surgeon to teach what he learns is one readily accepted by a member of the healing profession, no matter how important is the balancing of his professional budget. Maintaining the practice of this art above the level of the marketplace is a credit to the profession. In spite of occasional criticism, the doctor remains, in the words of Stevenson, "the flower of civilization," and his devotion to his art is a dedication to the ideals of prolonging of life and the relief of suffering. The art of healing has ever been applied with a sense of awe and reverence toward a Higher Power, going back to its beginning among priests, when it was applied to exorcise a demon. The work of doctors, like that of the clergy, is directed toward man's golden dream of the future. A world-wide international body of surgeons provides a helpful method of achieving the Brotherhood of Man. Each member thereof, as an individual surgeon, turns his best effort toward high human attainment as a member of the world-wide group, and thus contributes to the highest human aspirations and hopes for the future.

People with a fleshy, soft or ruddy appearance are best kept on a dry diet for the greater part of the year as they are constitutionally moist. Those with firm and tight-drawn skins, and those with tawny or dark complexions, should keep to a diet containing plenty of fluid most of the time, as the constitutions of such people are naturally dry. The softest and most moist diets suit young bodies best as at that age the body is dry and has set firm. Older people should take a drier diet most of the time, for at that age bodies are moist, soft and cold. Diets then must be conditioned by age, the time of year, habit, country and constitution. They should be opposite in character to the prevailing climate, whether winter or summer. Such is the best road to health.

—*Hippocrates*

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

A clinical Prospect of the Cancer Problem (Introductory volume of **Monographs on Neoplastic Disease at Various Sites).** By D. W. Smithers. Baltimore: The Williams and Wilkins Company, 1960. Pp. 232, with 46 illustrations and 10 tables. *Reviewed in this issue.*

Congenital Malformations: A Ciba Foundation Symposium. Edited by G. E. W. Wolstenholme and C. M. O'Connor. Boston: Little, Brown and Company, 1960. Pp. 308, with 91 illustrations. *Reviewed in this issue.*

Thymectomy for Myasthenia Gravis. By Henry R. Viets and Robert S. Schwab. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 130, with 32 illustrations.

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations. *Reviewed in this issue.*

Clinical Gastroenterology. By F. Avery-Jones and J. W. F. Gummer. Springleld, Ill.: Charles C Thomas, Publisher, 1960. Pp. 652. *Reviewed in this issue.*

The Femoral Neck—Function, Fracture Mechanism, Internal Fixation: An Experimental Study. By Victor H. Frankel, Springleld, Ill.: Charles C Thomas, Publisher, 1960. Pp. 119, with 58 illustrations. *Reviewed in this issue.*

Les Cavités Cardiaques: Introduction Anatomique a la Chirurgie Intracardiaque (The Chambers of the Heart: An Anatomic Introduction to Intracardiac Surgery). By E. Henry, R. Courbier and P. Rochu, with a preface by R. de Venrijoul. Paris: Masson et Cie., 1960. Pp. 176, with 196 illustrations. *Reviewed in this issue.*

General Anesthesia for Neurosurgery. By Robert I. W. Ballantine. Boston: Little, Brown and Company, 1960. Pp. 152, with 68 illustrations. *Reviewed in this issue.*

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

Calcium Metabolism and the Bone. By Paul Fourman. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 325, with 7 illustrations. *Reviewed in this issue.*

Chemical Osteosynthesis in Orthopaedic Surgery. By Michael P. Mandarino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 72, with 36 illustrations. *Reviewed in this issue.*

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

"Except for a rare patient who has survived for a few years as a green, potbellied, sickly dwarf, the infant born with biliary atresia (agenesis) dies within a year" (Sterling). This dire prognosis faces a considerable number of infants, since the condition has been observed in 1 of every 300 autopsies performed on newborn infants. This slender volume, one of the American Lecture Series, describes the author's experience in his attempts to provide relief from the sequelae of this serious congenital malformation.

In seeking to establish biliary channels that will relieve the jaundice and prevent the inexorable progression of fibrosis of the liver and its sequelae, he has thrust numerous perforated silver tubes into the substance of the liver and has obtained biliary bile flow from the large proportion of them that tapped "lakes" of bile. In this book he reviews his first 10 cases, presenting the clinical, laboratory, biopsy and postmortem data. Initially the bile was drained to the outside, with the intention of subsequently converting the external fistula into an internal one. Although bile flow was established and the condition of the young patients improved, complications ensued that made the second stage impossible. Encouraged by the evidence that reorganization of the hepatic structure occurred in the areas drained by tubes and that the development of cirrhosis could be prevented or delayed by timely intervention, he persevered by creating one-stage internal fistulas, draining the bile into some portion of the gastroduodenal tract.

An indication of the courage and persistence displayed is the fact that only 1 child of the 10 whose cases are reported survived and was leading a normal life. Perhaps the most dramatic statement in the book is the postscript: "Addendum: As of December, 1959, eight intrahepatic stresia babies are alive and well, with bile in the intestinal tract for postoperative intervals of six months to over two years."

LEO M. ZIMMERMAN, M.D.

Congenital Malformations: A Ciba Foundation Symposium. Edited by G. E. W. Wolstenholme and C. M. O'Connor. Boston: Little, Brown and Company, 1960. Pp. 308, with 91 illustrations.

The Ciba Foundation was organized under British trust law as a unique institution for the promotion of medical and chemical research by international cooperation. Through a short span of years some two dozen symposiums and colloquiums have been held in its hospitable home in London. A corresponding number of books embody the proceedings of those meetings. The emphasis is on up-to-date technics, frank discussions by specialists and experimental results that often foretell "breakthroughs" at the frontiers of medical research.

This stimulating little volume is the record of the latest Conference, to which 18 experts from Britain and 11 from other countries had been invited (5 from the United States). Twelve formal papers and the ensuing discussions are included. The volume gives a broad perspective of the new concepts in the long-neglected and difficult field of teratogenesis.

One report deals with the incidence of faulty development, the death rate, associated anomalies, sex ratio for specific malformations and life expectancy. The basis of this statistical study was a series of 57,000 consecutive births in Birmingham, England. Comparisons were made with data on other populations (Sweden, Japan).

Two papers concern the genetic causes of malformation and chromosomal abnor-

mality. Many defects in experimental animals and in man now have been traced to single specific genes. In cases of harelip, cleft palate and some types of congenital heart disease the genetic factor may effect merely a disposition. In cases of mongolism there is a supernumerary chromosome.

It has been established recently that the diploid number of chromosomes in man is 46 (instead of 48, as previously supposed). They are now being studied by "squash" technics by using bone marrow or cells grown in tissue cultures. Within a year, five conditions were observed to be associated with chromosomal abnormality: mongolism, Klinefelter's and Turner's syndromes, the "triple X" condition and polydysspondylia. These may entail abnormalities in the number of either sex chromosomes or autosomes, or structural changes of chromosomes.

A number of papers deal with environmental factors. The time at which noxious agents (e.g., rubella) become effective is all-important. There are critical periods during which different organ systems of the embryo are vulnerable. Hypoxia, nutritional deficiences, etc., may produce the same adverse effects, or a single agent may produce different abnormalities if applied at different times. The role of influenza in the genesis of congenital defects in man is still speculative.

Several tumor-inhibiting chemicals (antagonists of folic acid and glutamine) were shown to have marked teratogenic effects in pregnant rats. Actinomycin D, even in small doses, produces similar malformations.

Retardation and arrest of development due to a deficiency in pterolglutamic acid are reported in an excellent experimental study. Such effects were readily obtained by adding the antimetabolite, x-methyl-pterolglutamic acid, to the diet of rats. Embryonic tissues are much more sensitive than is the maternal organism. The second week of pregnancy proved to be the "critical period." Specific anomalies with a high incidence were edema, and anemia, defects of the skeleton, palate and face (harelip) and defects of the kidneys and eyes. Severe cerebral defects (anencephaly, hydrocephalus) were obtained with a vitamin-deficient regimen on the seventh and eighth days of gestation. Similar malformations are known to occur in the human fetus after clinical or illicit abortions induced by aminipterin (10-12 mg. between the fiftieth and the sixtieth day).

One report considers the possible interaction of teratogenic agents. There is still a lack of specific information as to the mode of action of many deleterious agents. The frequency of cleft palate and exencephaly in rats was increased with cortisone and decreased with insulin. The same teratogenic effects produced by hyperavitaminosis A were depressed by thyroxine and the B group of vitamins. It was concluded that large amounts of Vitamin A somehow interfere with the carbohydrate metabolism of the embryo. This was challenged in the discussion. The sensitivity of embryonic tissues to roentgen rays appears to be related to oxygen tension, since such effects were enhanced by thyroxine, insulin and massive doses of vitamins. They were reduced, instead, if cysteamine was given prior to irradiation.

The morphogenetic factors in anencephaly are considered in a report that recognized many causative experimental factors. Theories of overexpansion and secondary rupture of the walls of the brain were ruled out. The mechanism was observed to lie, instead, in the formation of a neural plate and a tube that remains open anteriorly, in which the normal folding processes are arrested. The cranial base may remain foreshortened, meningoceles may develop, and secondary necrotic processes destroy most of the inhibited brain.

A study of the relation between endocrine disturbances and "reproductive wastage" (malformations, miscarriages, etc.) presents observations on 116 patients who had had 353 previous pregnancies, only 30 per cent of which terminated in a normal birth. After treatment for concealed pre-diabetes or hyperthyroidism the same group had 127 pregnancies, 92 per cent of which ended with the delivery of a normal baby. It was postulated that adverse metabolic circumstances

may affect the production of Vitamin A. Night blindness during pregnancy may be a symptom of hypovitaminosis A. Anomalies of the heart and central nervous systems were frequently associated with the so-called pre-diabetes of pregnancy.

The final paper reports that, in fewer than half the cases, hydramnios is associated with maternal diabetes, toxemia and rhesus sensitization. The diagnostic criteria of hydramnios are blurred, and statistical data have little value. There is, however, general agreement in the literature that malformations, stillbirths and the early death of an infant without obvious anomalies are frequently associated with hydramnios. It cannot be detected during the "critical period" of organogenesis in the human embryo, which is from the fifth to the eighth week of ovulation age. Its causative relation to congenital malformations, therefore, remains obscure.

Of special interest are the recorded discussions, which reflect a "meeting of minds" among embryologists, anatomists, geneticists, pediatricians, obstetricians and other highly qualified specialists. There are many highlights in this volume. Yet it was recognized in the closing remarks by the chairman that there is "a long way to go" before one may expect final answers "on this very difficult subject."

ARNOLD ZIMMERMAN, M.D.

Calcium Metabolism and the Bone. By Paul Fourman. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 325, with 7 illustrations.

This book is divided into three sections. The first 43 pages are devoted to the physiologic and chemical pathologic aspects of calcium and posphorus and of the parathyroid glands. The next 132 pages describe metabolic diseases of bone, with the greatest emphasis on osteoporosis, rickets, osteomalacia and parathyroid diseases. The third section of 39 pages covers uremic osteodystrophy and renal tubular disease. There are 75 pages of references.

The author's professed aim is to discuss metabolic bone disease against a background of both old and recent research. He has succeeded in giving a simple, clear didactic discussion of the subject, documented by some 1,400 references from the world literature, most of which are to articles written in the past five years. This amazing ability to combine a smooth exposition with a thorough monographic survey of the recent literature surely makes the work a valuable contribution. In addition, physician readers will be pleased to find numerous nuggets of clinical information gathered from both the literature and the author's experience.

The very virtue of the book, however, is also its greatest weakness. The discussions are often far too brief. For example, the process of bone formation is discussed in two short paragraphs. Also, since it is impossible to find complete agreement in investigations of any subject, the reported divergent results often serve only to confuse the reader. Indeed, one tends to gain the impression that, in spite of the astounding amount of work done in the field of calcium metabolism in the past decade, the theories of Albright and Reifenstein still stand like a banner—a little faded, a little tattered, but still proudly waving in the breeze. Such an impression—whether produced consciously or unconsciously by the author—should not detract from the value of the book as a modern appraisal of calcium metabolism.

WILLIAM S. HOFFMAN, M.D.

A Clinical Prospect of the Cancer Problem (Introductory volume of **Monographs on Neoplastic Disease at Various Sites**). By D. W. Smithers. Baltimore: The Williams and Wilkins Company, 1960. Pp. 232, with 46 illustrations and 10 tables.

This is the first of a series of monographs on neoplastic diseases at various sites. The author correctly indicates that the book is addressed by a clinician to clinicians. It is deliberately filled with conjecture.

The monograph is an informative survey of basic information pertaining to the problems of carcinoma and is punctuated with the biased opinions of the author. Many statements are provocative, evidently pur-

posely so. The style is good, and the references are as numerous as possible under the stated purpose of trying to give the reader a perspective.

The author (a radiologist) approves of surgical intervention and radiant energy as therapy for carcinoma and deplores the use of chemotherapy. He also disapproves of crash programs for carcinoma and criticizes the layman, the researcher and the clinician for attitudes of terror related to "the special evils in cancer cells" and for their naivetè in searching for a single cure-all for the many varieties of carcinoma.

The chapter on the natural history of carcinoma, including its side effects and the phenomenon of the functioning tumor, is the best part of the monograph. There is little new in this book, but it is a good introduction for the other monographs that are being added to the series.

EDWARD B. SMITH, M.D.

Chemical Osteosynthesis in Orthopaedic Surgery. By Michael P. Mandarino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 72, with 36 illustrations.

This small volume consists principally of accounts of 50 cases in which a specific urethane polymer (Ostamer) has been used in the surgical correction of nonunion of the tibia, femur and lumbar portion of the spine, as well as nonunion of the sternum following sternum-splitting operations incident to cardiac procedures. The author illustrates the problem cases by means of roentgenograms. A five-page chapter on histology by Dr. Joseph Imbriglia, Professor of Pathology at Hahnemann Medical College and Hospital reports experimental studies dealing with the fractured femurs of 3 dogs. The urethane polymer was used in setting the fractures, and no toxic reaction was observed. The substance is relatively new and is apparently useful in a variety of reparative procedures on bone, including those dealing with pathologic fractures.

Appraisal of the surgical aspects of the usefulness of the urethane polymer is apparently accurate. One may question a few rather broad statements, such as the one on page 34 that "it would be negligent, indeed, to treat this type of case (bone cyst) in any other way than with Ostamer." One may wonder also why the author did not abbreviate this monograph and publish it as an article in an internationally distributed journal of surgery.

EDWARD B. SMITH, M.D.

Surgical Treatment of Unequal Extremities. By Charles Weer Goff. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 171, with 136 illustrations.

This is a well written monograph with splendid photographs, roentgenograms and charts. Each clearly shows exactly what was intended.

The work represents a careful review of the literature on the subject, plus carefully documented information from the Newington Hospital for Crippled Children.

The photomicrographs are superb, and each clearly shows either the normal or abnormal to such a degree of clarity that even those with little experience in microscopic pathology can readily understand what is shown. This is a pinnacle of perfection infrequently achieved in current publications.

The growth of long bones is well presented, as are the causes and suggested treatment of unequal leg lengths. Controversial points are impartially presented. Surgical treatment of leg shortening and leg lengthening is shown and discussed. The author leaves little doubt that, when both sides of the problem are presented, leg lengthening is the more difficult, involves a longer convalescence and has more complications.

Fractures of the lower extremities and their effect on shortening or overgrowth of the extremity are well illustrated and discussed.

The various methods of measuring discrepancies in leg length are carefully described, and the method used at Newington at present is meticulously described and well illustrated.

The chapter on epiphyseal growth control

by staples is outstanding, and is worthy of time and attention of anyone interested in this phase of orthopedic surgery.

CARLO SCUDERI, M.D.

Les Cavités Cardiaques: Introduction Anatomique a la Chirurgie Intracardiaque (The Chambers of the Heart: An Anatomic Introduction to Intracardiac Surgery). By E. Henry, R. Courbier and P. Rochu, with a preface by R. de Vernijoul. Paris: Masson et Cie., 1960. Pp. 176, with 196 illustrations.

Cardiac surgery has taken on a new look, both anatomically and physiologically. Up until the past ten years the cardiac chambers had been studied chiefly by physicians, but now they are endowed with particular interest to the surgeon. Classic knowledge of anatomy, based on the study of cadavers, has been modified and in some instances even replaced by more intimate knowledge of the requirements of surgical exploration of the living organ.

This knowledge of the heart's true nature has accelerated intracardial technical progress to a speed comparable only with that which has been observed in the neurosurgical field. The authors of this book use both the classic knowledge and the new results of research, as well as many modern surgical observations, to implement their work.

In the preface the book is described as "a real anatomic introduction to surgery of the heart." The surgical anatomic studies are based on direct visualization and palpation, both of the cardiac chambers and of the great vessels that can be explored or treated from one of the chambers. The description includes a pathologic presentation of various cardiac diseases, congenital and acquired, which adds substantially to the clarity of the total picture. The chambers of the right side of the heart (atrium, ventricle, tricuspid valve and pulmonary artery) and those of the left (atrium, ventricle, mitral valve and aorta) are thoroughly studied. Modern roentgen technics and facts determined by means of catheters justify this right-left classification of the chambers.

The interauricular and interventricular septums are described as they appear after incisions have been made in the atrium and in the right ventricle.

The whole of this information, expressed in a spatial scheme, is the subject of a chapter. The anatomic development of the heart and the various congenital cardiac malformations are illustrated with drawings, charts and photographs. Finally, in the section on surgical exploration of the cardiac chambers, all the observations up to this point are collected and correlated with the authors' exposition of the different surgical tactics now in use.

JORGE A. TAIANA, M.D.

Intestinal Obstruction. Edited by Edmondo Malan, and fourteen authors have contribfiche, 1960. Pp. 310, with 65 illustrations.

The compact volume contains a wealth of information on the physiologic and pathologic changes that accompany intestinal obstruction, as well as the clinical aspects of the subject. It has been ably edited by Prof. Malan, and fourteen authors have contributed to the text.

The book summarizes clearly most of the current knowledge of intestinal obstruction and its various manifestations, expounding both the clinical and the laboratory phases.

The first chapter is devoted to local effects, touching on intraluminal secretions, transudates, accumulations of gas, and changes in motility, pressure, circulation, absorption and neural activity. In the chapter on systemic effects are included volumetric changes, electrolyte imbalance, acid-base phenomena, protein disturbances, acidosis, alkalosis and fluid changes. Subsequently the effects of obstruction on distant organs and systems, respiratory, circulatory, hepatic, renal, splenic, pancreatic, myocardial and musculoskeletal, are described. The states of toxemia and shock are discussed at length.

In the chapter on diagnosis the various levels of obstruction are pointed out, each implemented with enumeration of the symptoms and the results of laboratory tests. Material on the interpretation of roentgen studies completes this chapter.

Under "nonoperative treatment" are discussed the preoperative use and misuse of intubation technics, intravenous fluids, electrolytes, antibiotics, whole blood, plasma and sedatives. Therapy during the operative period emphasizes suction, as well as the administration of blood, plasma, fluid and electrolytes. Postoperative care includes suction, vitamin therapy, the use of antibiotics and the administration of electrolytes and fluids.

Another chapter, confined to pathologic material, is an excellent summary of the clinical entities that are major causes of intestinal obstruction. These range from hernias and adhesions to neoplasms and rarer conditions. Congenital causes are also dealt with and correlated with the associated physiopathologic phenomena.

The final chapter is a notable contribution to knowledge and understanding of anesthesia, listing the technics and preoperative measures necessary in order to obtain good anesthesia with safety.

Most wisely, the book emphasizes the fundamental aspects of a complex surgical problem. It should be profoundly interesting to students and specialists alike.

DANIEL H. MANFREDI, M.D.

The Femoral Neck—Function, Fracture Mechanism, Internal Fixation: An Experimental Study. By Victor H. Frankel. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 119, with 58 illustrations.

This book is a thesis, the work of which was done at the Biomechanical Laboratory of the Department of Orthopedics at the University of Uppsala, Sweden. The work was carried on with some technical assistance from the Royal Institute of Technology of Stockholm.

An excellent bibliography is included, and the experimental material is well illustrated and documented.

Much of the exeprimental work is highly technical, and a degree in mechanical engineering, or the assistance of a friend with such a degree, are imperative for a thorough understanding of the work.

The illustrations are of excellent quality, the roentgenograms flawless in detail and the charts and graphs of maximum clarity.

For those interested in this subject, a four-page summary at the end of the book clearly presents the conclusions of the author and permits the reader to decide for himself how deeply he cares to delve into the highly technical phases of the problem.

CARLO SCUDERI, M.D.

The vigor of civilized societies is preserved by the widespread sense that high aims are worth while. Vigorous societies harbor a certain extravagance of objectives, so that men wander beyond the safe provision of personal gratifications. All strong interests easily become impersonal, the love of a good job well done. There is a sense of harmony about such an accomplishment, the Peace brought by something worth while. Such personal gratification arises from aim beyond personality.

—*Whitehead*

Abstracts from Current Literature

Die Corticoid-therapie des eosinophilen Granuloms des Knochens (Corticoid Therapy of Eosinophile Bone Granulomas). Schnabel, B. W., Deutsche med. Wchnschr. 85:304-307, 1960.

This paper discusses the still obscure causes of the disease and describes in detail five different forms. Three cases observed personally by the author are included.

The author states that prolonged corticoid therapy produces roentgenographically visible improvements in the pathologic bone in cases of eosinophile granuloma. The development of new foci can be suppressed. It is pointed out, however, that these improvements do not represent a cure of the disease. The mechanism of the corticoid effect on the bone is unknown. Often hypercortisonism occurs.

Since spontaneous cures never occur, the author is convinced that prolonged corticoid therapy is useful because (1) remissions can be obtained with relative speed; (2) all foci of infection can be treated simultaneously, and (3) new granulomas can be prevented.

L. L. FORCHHEIMER, M.D.

Esophageal Hiatal Hernia. McBurney, R. P., Arch. Surg. 81:90, 1960.

The author advocates the Allison posterior repair of hiatus hernia by an abdominal approach. His results after a one-year follow-up (83 per cent cures) leads him to urge liberalizing the indications for operative treatment of hiatus hernia; he regards symptoms of esophagitis as a positive indication. His technic has evolved from the Harrington lateral repair of the hiatus defect (in which the contracting muscle pulls on the sutures) to the Allison repair of the posterior area (where the hernias begin). He prefers the abdominal route for diagnosis and therapy of concomitant lesions.

An adequate operation closes the defect, removes the sac, corrects gastric displacement and reconstructs the membrane between the diaphragm and the stomach to anchor it. In the author's opinion, earlier operation might affect favorably the overall morbidity and mortality rates of the disease, especially among those who do not accept the discipline of strict medical care.

Awaiting hemorrhage, incarceration, intractable symptoms or stricture formation before operating invites difficulty. When results were unsatisfactory, a psychophysiologic mechanism appeared to be the cause.

SIDNEY VERNON, M.D.

The Role of Inflammation in Carcinogenesis. Menkin, V., Brit. M. J. 1:5186, 1960.

This is a lecture reviewing material the author deems pertinent in support of the inflammatory theory of carcinogenesis.

His own studies venture the hypothesis that an inflamed area liberates "chemical mediators" from injured cells and that possibly a like mediator may be present in exudate, which could account for repair. It is reasoned that exudate contains products of cellular injury, together with elements from circulating blood. Exudative material obtained from the inflamed pleural cavity of a rabbit, however, if repeatedly injected for months into a rabbit's ear or breast, causes the development of nodules that yield a heterogenous or proliferative group of cells arising from the perichondral area with metaplastic bone transformation, and the epithelium shows much hyperplasia, with tongues dipping into the corium. When a control serum not of inflammatory origin is

injected at intervals, it apparently causes no change of the cartilagenious plate. Croton oil or some other irritant, when injected directly into a rabbit's ear, does not produce a similar picture after the inflammation subsides. The author, on the strength of these experiments, expresses the opinion that the substance present in the exudate product of inflammation is the cause.

A method is described for dialyzing the material in a concentrated form, and the presence of a growth promoting factor in inflammatory exudate is assumed to be demonstrated. This same factor, moreover, is theoretically the instigator of repair and behaves as a co-carcinogen when combined with a carcinogenic hydrocarbon, such as methyl cholanthrene. The neoplastic effect is deduced to be dependent on several factors, among which is a hereditary tendency reinforced by liberation of the endogenous growth-promoting factor in exudates, which in turn acts as a co-carcinogen. The growth-promoting substance is diffusible, heat-stable, soluble in acetone and inactivated by trypsin and ribonuclease, signifying its nucleopeptide composition.

It is emphasized that in itself this growth factor does not produce autonomous neoplastic processes but requires a carcinogenic hydrocarbon to achieve its co-carcinogenic effect.

PAUL R. BRIGGS, M.D.

Arthrodese und Sehnenplastik: Wesen und Bedeutung in der Spaetbehandlung der Poliomyelitis (Arthrodesis and Tendon Plastic: Method and Value in the Late Treatment of Poliomyelitis). Ruett, B. W., Deutsche med. Wchnschr. 85:299-316, 1960.

This paper describes in detail different forms of flaccid motor paralysis that occur as late results of poliomyelitis. The author mentions treatments with corsets, splints and orthopedic shoes but stresses the fact that here treatments should be supplemented, at later stages of the disease, by surgical measures.

Such measures should not be undertaken until two years after the infection has subsided and should never be started in patients under 14 years of age.

The tendon plastic has the purpose of replacing paralyzed muscles by shifting one or more healthy muscles. The author points out that the main difficulty is that it is impossible to measure quantitatively the muscle power of the paralyzed and the still functioning muscles. Experience, therefore, has to take the place of exact measurement.

He stipulates that any tendon plastic procedure requires the following conditions:

1. Any joint contracture must be eliminated beforehand.

2. The patient must be at least 6 years old to be able to cooperate in the postoperative treatments.

3. The paralysis must be simple, i.e., it should be limited to one muscle group.

4. The replacement muscle must be intact.

5. The transplanted muscle must function in the same general direction as the paralyzed one.

Owing to these requirements, the tendon plastic operation *alone* can be carried out only rarely. It is more frequently useful, however, in connection with arthrodesis.

The author then discusses several forms of paralysis for which arthrodesis may be indicated. The purpose of this procedure is summarized as "stabilization of the joints, conservation of the most important motion, and elimination of a one-sided pull on the bone by any muscle."

The text is supplemented by several pages of instructive photographs.

L. L. FORCHHEIMER, M.D.

Plastic Surgery: The Hand. Cannon, B., and Peacock, E. E., Jr., New England J. Med. 263:238, 1960.

The hand, one of man's most important assets, is subject to a wide variety of disabling diseases and every manner of major and minor trauma.

Repair of injuries to the hand and lacerations of tendons should be carried out only if the wound is less than eight hours old, if there is no danger of contamination, if a bloodless field and proper operating facilities are available and, finally, if the surgeon is prepared to carry out complex repairs, using grafts, flaps, etc.

E. G. LINHARDT, M.D.

Dupuytren's Contracture: A Morphologic Evaluation of the Pathogenesis. Stein, A., Wanz, M. K. H., Macomber, W. B., Rajpal, R., and Helfernan, A., Ann. Surg. 151:577, 1960.

The authors studied the histopathologic picture of Dupuytren's contracture in 98 cases in which they performed operations. The individually excised tissues were examined microscopically, and then several different staining technics were used to establish the possible pathogenesis of the lesion. For comparison, the authors excised palmar fascia from hands without clinical Dupuytren's contracture. This control tissue series was taken from 30 hands of cadavers in an anatomic laboratory. After making a thorough study of the surgical specimens and the control specimens and using many different staining technics, the authors outlined their ideas on the probable pathogenesis of Dupuytren's contracture. At the outset they agree with the postulation of Krogius,* that the superficial flexor brevis muscle present in the human embryo usually disappears in the adult palm. When it persists, however, its tendinous degeneration is responsible for the development of Dupuytren's contracture.

In their study, the authors noted slips of rudimentary muscle in the palmar fascia in 47 per cent of the normal hands comprising the control series. In their opinion this rudimentary muscle is derived phylogenetically from the flexor brevis superficialis muscle. In the surgical specimens studied, hyperplastic muscle was observed in 77 per cent of the palmar fascia removed from hands with clinical Dupuytren's contracture. This muscle apparently undergoes varying degrees of perifascicular and intercellular hyalinization. There seems to be, according to the authors, a definite relation between the progressive hyalinization of this muscle and that associated with torticollis. Furthermore, it is their impression the cause of the Dupuytren's contracture includes, in addition to trauma, an inherited recessive trait in a certain percentage of persons. This inherited trait is the retention of primitive muscle tissue in the palmar fascia. The localization, extent and speed of the fibrous change that takes place with Dupuytren's contracture are functions of the location and volume of persistent muscle and the extent of injury to the muscle. All of these factors appear to determine the clinical stages of the disease.

CHARLES M. SWINDLER, M.D.

*Acta chir. scand. 54:33, 1921.

Inferior Vena Cava Ligation in the Treatment of Pulmonary Embolism. Moses, M., and Adar, R., Surgery 48:374, 1960.

The authors report 20 cases of pulmonary embolism treated by ligation of the inferior vena cava.

Their experience has strengthened their belief in this procedure as follows: 4 patients on effective anticoagulant therapy threw emboli; 9 patients threw additional emboli following ligation of the superficial femoral vein. No patient, however, showed further embolization after caval ligation.

Two patients died, 1 of congestive heart failure and the other of a fresh coronary occlusion. Sequelae in the survivors have been insignificant, considering the gravity of the situation. Mild edema and tiredness of the legs have been common self-limited problems. In 2 patients Stein's ulcers developed, only one of which has become chronic. Supportive bandaging has satisfactorily controlled the most severe postoperative discomfort.

The authors point out that accurate determination of the site of origin of an embolus indicates the practicality of caval ligation, the effectiveness of which is indicated in this series.

It is concluded that a patient in whom a pulmonary embolus develops should undergo immediate ligation of the inferior vena cava.

EDWARD E. MURDOCK, M.D.

Delayed Closure in Peripheral Vascular Reconstruction. Lape, C. P., Am. J. Ophth. 263:383, 1960.

Direct reparative surgical intervention is well established as both practicable and desirable in the treatment of traumatic, aneurysmal and occlusive disease of the major arteries, as well as some congenital conditions. The simple physical size of the smallest artery involved in a vascular reconstruction may be the critical factor in bringing about the late occlusion that is often observed. There appears to be no significant correlation between the rate of late failure and any other factor. Progression of atherosclerosis of the host vessel may not be necessary for the production of this complication and is perhaps only rarely its major cause. A rate of occlusion of approximately 35 per cent will usually be observed a year after angioplasty, involving vessels smaller than the common femoral artery, until a major revision of anastomotic technic or postoperative management is developed. Disproportionately large bypassing prostheses and the relatively hugh terminolateral anastomotic suture lines that they would require should be studied experimentally. A large-scale clinical trial of chronic potoperative anticoagulant therapy appears logical.

BERNARD J. FICARRA, M.D., Sc.D.

Wilms's Tumor: A Review of 47 cases. Kinzel, R. C., Mills, S. D., Childs, D. S., and De Weerd, J. H., J.A.M.A. 174:1925, 1960.

The authors point out that there is still considerable difference of opinion as to the best method of treating one of the most common and devastating malignant diseases of children. In the literature there are six large series in which the three main forms of treatment are compared, namely, preoperative irradiation and nephrectomy, nephrectomy and postoperative irradiation, and both preoperative and postoperative irradiation and nephrectomy. Four of the five series demonstrate that the highest two-year survival rate was obtained by using preoperative and postoperative irradiation. In one series the best results were obtained with nephrectomy and postoperative irradiation. The authors reviewed the results of treatment in 47 cases of histologically proved Wilms tumor encountered at the Mayo Clinic in the fifteen-year period from 1941 through 1955. They noted that the most effective treatment consisted of preoperative irradiation, nephrectomy and postoperative irradiation, with a three-year survival rate of 57 per cent. The most important prognostic factor was the age of the patient: the five-year survival rate was 67 per cent for those less than 2 years old at the time of diagnosis. Other factors that affected the prognosis unfavorably were the presence of tumor thrombi in the renal veins, capsular involvement and the size of the tumor.

CARL K. PEARLMAN, M.D.

The Visualization of the Vascular System. Baker, H. L., Jr., J. Iowa State M. S. 50:535, 1960.

In the past several years, angiographic study of the anatomopathologic aspects of arterial disease in the living patient has dispelled previous notions that atheromatous involvement of the vascular system is always diffuse. Contrarily, it has been discovered that atherosclerosis is often uneven in its distribution and that occlusive processes may be limited to relatively short arterial segments. This fact has practical importance, because the patient can be helped by corrective surgical procedures, especially when abdominal portion of the aorta is involved. The same may be said of aneurysms after they have been properly visualized by roentgen studies. Arteriovenous malformations may occur anywhere in the body. There may be some that are not readily identifiable without the aid of the roentgen ray. Here again their localization will assist in their surgical correction if this is possible. Roent-

gen study of the kidneys is an old procedure. Many vascular lesions in and about the kidneys can now be identified, and the surgeon can take the proper steps to correct them.

The author reviews some of the vascular disorders commonly encountered in day-to-day practice. An understanding not only of their clinical and pathologic features but of recent therapeutic procedures employed in their treatment is important. When this has been acquired, the importance of angiographic study becomes obvious.

BERNARD J. FICARRA, M.D., Sc.D.

The Relation Between Diabetes Mellitus and Infections of the Urinary Tract. Szucs, S., and Cserhati, I., Am. J. Med. Sc. 240:186, 1960.

Infections of the urinary tract have long been known to be a frequent and serious complication of diabetes. Observers in the authors' diabetic clinic were impressed by the fact that the patients rarely complained of symptoms pointing to infections of the urinary tract. This prompted them to study the frequency and seriousness of genitourinary infections in their diabetic patients, using qualitative and quantitative bacteriologic methods. Surprisingly, the results of their investigations suggested that clinically active urinary infection is *not* more frequent among diabetic persons than in the average population. This, however, is qualified by the statement that they could not prove any predisposition to infection in the "well controlled" group, whereas "badly controlled" diabetic patients, at least female patients, seem more susceptible to bacteria. They emphasize the point that the diabetic state itself does not involve predisposition to urinary infection; the important factor is good control of the disease.

CARL K. PEARLMAN, M.D.

Adenocarcinoma of the Large Bowel. Gilbertsen, V. A., J.A.M.A. 14:1789, 1960.

The prognosis of carcinoma of the large bowel is poorer than is implied in the current medical literature. The five-year survival rate is no greater than 50 per cent. The usual patient with malignant disease of the large bowel has the possibility, but not the probability, of cure. It is apparent, then, that more emphasis must be placed on recognition of the diagnostic significance of the common symptoms of such disease.

E. G. LINHARDT, M.D.

Elastic Tissue Degeneration in Sickle Cell Disease. Geeraets, W. S., and Guery, D., III, Am. J. Ophth. 50:213, 1960.

The authors suggest that there may be a causal relation between sickle cell disease and degenerative changes in elastic tissue. They review the general systemic diseases in which pathologic change occurs in the elastic tissue of the vascular system as well as of the ocular fundus: (1) the Groenblad-Strandberg syndrome; (2) osteitis deformans; (3) atherosclerosis, and (4) sickle cell disease.

Theories of elastic tissue degeneration are reviewed, and the histopathologic picture of each of these disease entities is described.

ROBERT F. AZAR, M.D.

Corticosteroids In Preoperative Medical Management of Ulcerative Colitis. Ewart, W. B., Lennard-Jones, J. E., Lancet 2:60, 1960.

This study involves consideration of 131 patients operated on for ulcerative colitis (one-stage subtotal colectomy with ileostomy) and does not consider secondary procedures. It compares the results obtained by those who have used corticosteroids preoperatively and those who have not.

Age, associated diseases and severity of illness were considered. The mortality rate was 13 per cent in the steroid group and 6 per cent. The most important prognostic death in more than half the cases in both groups. The cause of death next in frequency was immediate postoperative circulatory collapse that did not respond to treat-

ment. Complications occurred more frequently in the patients medically treated with steroids prior to operation. The authors are convinced that there is little or no correlation between the preoperative dose of corticosteroids and the result of operation. The steroids were further admittedly causes of lower resistance to infection, impairers of wound healing and instigators of venous stasis with thrombosis and, possibly, irreversible shock. The authors express the opinion that preoperative medical care of colitis in the category mentioned should be continued, since in some cases it results in remissions, so that the general condition of the patient is better when operation is contemplated later.

PAUL R. BRIGGS, M.D.

Cancer Cells in the Blood Stream. Long, L., Roberts, S., McGrath, R., McGrew, E., and Cole, W. H., Arch. Surg. 80:129-135 and 639-645, 1960.

Carcinoma cells can be detected and isolated from the blood stream of many patients with malignant disease. New technics for the isolation and identification of these cells open new vistas in the study of prognosis and treatment, both surgical and chemotherapeutic.

The method of obtaining blood samples and of isolating the cells is discussed in detail.

The results obtained from the study of 1,276 blood samples taken from 328 patients with malignant disease and 35 with nonmalignant disease are carefully diagrammed and interpreted. The patients referred to as "curable" are those in whose cases resection of the tumor was considered adequate. The "incurable" patients are those with distant metastases or extensive local spread of the malignant lesion.

In the authors' series, 23 per cent of the "curable" patients had malignant cells in the peripheral blood and a higher percentage in the veins draining the tumor area. The "incurable" patients had a higher level as would be anticipated (28 per cent with cells in the peripheral blood and 39 per cent with cells in the blood draining the tumor).

In every case in which carcinoma cells were present in the peripheral (antecubital vein) blood of a patient with a malignant disease of the digestive tract, the patient was either "nonresectable" or "incurable." This is indicative of the major role played by the liver in destroying carcinoma cells brought in by the portal circulation. When the ability of the liver to destroy these cells vanishes and cells are found in the peripheral circulation, the patient is considered incurable.

Showers of cells have been found after many abdominal and pelvic procedures as well as during operations on the breast. It has been proved that manipulation of tissues dislodges carcinoma cells.

Response to surgery or to chemotherapy can be evaluated by study of the circulating cancer cells. Nitrogen mustard, for one example, cleared the peripheral blood stream of malignant cells in seventy-two hours. Response usually occurs within three to eight days.

The cells dislodged by operation, manipulation or a natural process of shedding can be destroyed by specific therapy, the effectiveness of which can be followed and appraised. The effectiveness of surgical intervention can be followed and judged in the same manner. Thus, by meticulous study and isolation of circulating carcinoma cells, it may be possible to determine *in vivo* sensitivity of a specific tumor to a specific drug in a specific patient.

CHESTER L. ROBERTS, M.D.

Prophylactic Chemotherapy for Burns. Cason, J. S., and Lowbury, B. J. L., Lancet 2:501, 1960.

The authors, a surgeon and a bacteriologist, by clinical and laboratory experiments well worked out, demonstrate that as a local dressing for burns a cream containing neomycin, cholorhexidine and polymyxin is useful. It improves the results of skin grafting and shortens healing time. The importance of controlling infection in burns is so great that any promising measure is worthy of inspection. Local therapy appears less likely than systemic therapy to evolve resistant strains of bacteria.

SIDNEY VERNON, M.D.

Fundamental Studies on Cytological Diagnosis of Gastric Cancer. Saito, T., and others, Tohoku J. Exp. Med. 71:237, 1960.

In their experience with gastric cytologic study by means of the abrasive balloon, the authors have confirmed that gastric desquamative cytologic study is a helpful complementary method rather than a competitor of roentgen examination in the diagnosis of gastric carcinoma. There are, however, several pitfalls in application of the principles of cytologic analysis; because of this it is recommended, therefore, that only with the aid of an expert cytologist should it be attempted, because interpretation of the material is as important as the obtaining of the specimen, if not more so. The authors describe their method of obtaining the material. They prepared smears of material taken directly from both carcinomatous and noncarcinomatous foci in the stomach after gastric resection, and the preparations were examined under the phase contrast microscope or by the May-Grunwald-Giemsa's staining method. Various problems of interpretation, such as distinguishing the carcinoma cell from desquamating epithelium are discussed. The illustrations accompanying the article are the major asset in the differentiation and instruction in this phase of the study.

BERNARD J. FICARRA, M.D., Sc.D.

Transplantation of the Homologous Canine Heart: Serial Studies of Myocardial Blood Flow, Oxygen Consumption, and Carbohydrate Metabolism. Reemtsma, D.; Delgade, J.P., and Creech, O., Lancet 2:501, 1960.

The authors, employing a modification of the F. C. Mann technic for transplantation of the mammalian heart, transplanted 27 canine hearts. These survived for periods varying from twenty-four to one hundred and forty-four hours. During this time, serial determinations of blood flow, oxygen consumption, dextrose utilization and lactate metabolism were made.

These studies were carefully planned and are well documented. Primarily the basic unit of measure employed was 100 mg. of heart muscle, which provides a widely applicable set of data.

Rather wide ranges were noted for several of the values, and this constitutes the primary weakness of the study, as one cannot know whether this wide variation is a result of the abnormalities imposed by the experimental method or whether such wide variations could exist under normal or nearly normal circumstances.

The authors report a mean myocardial blood flow of 160 ml. per hundred grams of heart muscle per minute, a mean oxygen consumption of 7.3 ml. per hundred grams of heart muscle per minute and a mean dextrose consumption of 14.6 mg. per hundred grams of heart muscle per minute. They encountered a negative lactate balance throughout the period of study and drew attention to the fact that one of the principal metabolic abnormalities associated with cardiac transplantation has to do with a derangement of the lactate-utilizing mechanism. The explanation of this fact, together with the discovery of means to prevent it, would seem highly significant in the further study of cardiac transplantation.

CHURCH E. MURDOCK JR., M.D.

Multiple Duodenal Ulcers with Fatal Hemorrhage. Wilkinson, L. H.; Simms, A. G.; Floyd, V. T.; Blank, W.; Grady, G. D., and McKnight, J., Arch. Surg. 80:753, 1960.

A case is presented of the syndrome of multiple duodenal ulcers, pronounced gastric secretion and neoplasm of the non-beta-islet cells. There was 2,200 cc. of gastric secretion, with 154 mEq. of free hydrochloric acid, associated with a gastrojejunocolic fistula, a jejunojejunal fistula and multiple jejunal ulcerations; at autopsy, examination of 100 histologic microsections of the pancreas revealed a tumor 8 mm. in diameter, which, on special staining, disclosed hyperplasia of the islet cells that were not beta cells. The authors note that in some instances in which the pancreas was normal there were neoplasms of the adrenals or the pituitary gland. The treatment recommended for this syndrome (Zollinger-Ellison) is resection of

the non-beta cell adenoma at the time of operation and total gastrectomy; this removes the source of excess gastric secretion and hydrochloric acid output.

The authors mention 81 recorded cases in which the primary site of ulcerations was the second or third part of the duodenum or in proximal jejunum. In their own series, extrapancreatic endocrine tumors were present in 16 of the 81 cases, including parathyroid adenomas, pituitary adenomas and cortical adenomas of the adrenal gland. In 37 per cent of the reported cases there were malignant neoplasms of the endocrine glands. Total gastrectomy is advised in addition to pancreatic resection, to prevent the subsequent development of metastatic lesions. In confirming the diagnosis of this syndrome, twelve-hour studies of gastric secretion, to measure the total volume and the total hydrochloric acid gastric output, are considered important in diagnosis.

LAWRENCE G. KHEDROO, M.D.

Fracture of the Carpal Navicular. Russe, O., J. Bone & Joint Surg. 42-A:759, 1960.

Proper knowledge of the anatomy of the carpal navicular bone and the proper treatment of this fracture lead to union in 95 per cent of the cases. The author presents 220 cases, with 97 per cent union; this agrees with Bohler's results in the treatment of 500 fresh fractures of the navicular. When an injury to the navicular bone is suspected, the extremity should be immobilized for at least two to four weeks and then studied roentgenographically before the patient is dismissed. Four specific roentgen studies are routinely used in the investigation of this carpal bone. The cast recommended in the treatment of this fracture is unpadded and extends from the elbow to the metacarpal-phalangeal joints. The first metacarpal is included in the cast, but the thumb is not. The wrist is in neutral flexion and extension, and the third metacarpal is in line with the longitudinal axis of the forearm. The duration of immobilization depends on the location and type of fracture, varying from six to twelve weeks. The cast is not removed, however, until healing of the fracture is evident on the roentgenogram.

CHARLES A. ROCKWOOD JR., M.D.

Depressed Fractures of the Tibial Plateau. Rombold, C., J. Bone & Joint Surg. 42-A:783 1960.

It is the author's contention that the treatment of displaced condylar fractures of the tibia by rigid fixation and early knee motion leads to the best functional and anatomic results. In 15 cases in which this treatment was used, the results were very impressive.

At operation, tibial bolts, screws and longitudinal metallic struts were used to obtain the rigid fixation desired. Postoperatively, the knees were not immobilized and the patients were encouraged to move them as much as possible. Occasionally, if the patient has not established active motion by the third day, he is placed into balanced suspension, a Thomas splint with a Pierson attachment being used. Walking with crutches is allowed as soon as muscle control of the knee has been obtained. This is followed by gradual increase in weight bearing.

CHARLES A. ROCKWOOD JR., M.D.

Influence of Renal Denervation upon Renal Blood Flow. Jontz, I. G.; Schumacker, H. B., and Bounous, G., Surg., Gynec. & Obst. 110: 622, 1960.

The authors point out that although Claude Bernard observed over more than a hundred years ago that section of the splanchnic nerves of an anesthetized animal results in an increased flow of urine, investigators since that time have found no evidence of any significant difference in blood flow through normal and denervated kidneys in unanesthetized animals or men. The authors undertook the study of the effect of unilateral thoracolumbar sympathectomy and splanchnicectomy on the renal blood flow in dogs. Their technic differed from those of other investigators in that they used direct rather than indirect methods of measuring renal blood flow. Their experiments showed that

the denervated dog's kidney has a blood flow somewhat greater than normal under the stress of anesthesia. When the stress of hemorrhagic shock is added, the difference in flow is decidedly increased. The mean flow of the denervated kidney of the dog in severe hemorrhagic shock is nearly twice the normal. The authors express the opinion that the differences observed in their experiments were more clearcut than those observed by others because of two factors: (1) the utilization of direct measurement of renal blood flow, and (2) the fact that their animals were subjected to complete unilateral sympathectomy and splanchnicectomy, while in most of the other animal experiments denervation of the kidney was attempted by regional and probably inadequate sympathectomy, by stripping of the renal vessels, freeing of the renal pedicle and by infiltration of the renal pedicle with anesthetic agents or alcohol.

CARL K. PEARLMAN, M.D.

Another Hopeful Look at Ureterosigmoid Anastomosis. Nesbit, R. M., J. Urol. 84:691, 1960.

This paper is recommended to any surgeon who must face the problem of supravesical diversion of urine. The author reviews briefly but adequately the history of the various procedures for ureterointestinal anastomosis. The high incidence of dehiscence at the anastomotic site resulting in peritonitis, which has a high incidence in cases of fecal fistula or urinary fistula, or both, was to a large extent prevented by the technic introduced by Dr. Coffey. In many of the patients, however, ureteral obstruction developed at the site of anastomosis, and the occurrence of hydronephrosis and pyelonephritis were frequent late sequelae of the operation. Many modifications of the Coffey technic have been attempted in an effort to prevent these complications.

The two late complications of ureterosigmoid anastomosis were related to ascending infection from reflux or were due to renal damage from obstruction. This resulted in pyelonephritis and electrolyte imbalance, i.e., hyperchloremic acidosis.

The work of various investigators is discussed in some detail, indicating a shift of opinion from the theory that ureterocolic anastomosis is doomed to failure, since man cannot hope to live a cloacal existence, to the idea that reabsorption of urinary constituents from the colon occurs constantly after ureterosigmoid anastomosis. Hyperchloremic acidosis, however, does not occur if renal function is good. The development of electrolyte imbalance in such cases, therefore, is determined by the presence or absence of impairment of renal function. The alternative to ureterocolic anastomosis is either cutaneous ureterostomy, nephrostomy or the ileac conduit. Although the last-mentioned procedure is enjoying a wave of enthusiastic acceptance, a long-term follow-up of the patients demonstrates that some of them, also, have serious complications apparently inherent in the procedure. Dr. Nesbit mentions a few examples of long survival in patients who have adapted satisfactorily to a cloacal existence. One patient operated on by Charles Mayo has lived forty-two and one-half years since the operation, and another has survived for thirty-nine years. Neither has had symptoms of pyelonephritis. Nesbit also discusses several of his own patients who have survived for long periods. In all of these cases the tunnel-valve principle was employed.

The author presents a new technic utilizing the submucosal tunnel principle of Coffey as well as the intraluminal nipple principle of Mathisen. In this technic a full thickness flap of the sigmoid, 3 by 3 cm., is used. A submucosal tunnel is made in this flap, which is then folded back on itself to fashion a nipple. The nipple is dropped into the lumen of the bowel, which is then closed. Postoperatively, the 4 patients have had normal pyelograms, and with 1 exception the blood chemical values have remained normal. The author concludes his article with a plea that continued efforts be made toward improvement of technic, in the hope of eventually solving a problem that has been a frustrating challenge to imaginative surgeons for more than a century.

CARL K. PEARLMAN, M.D.

Flexor Tendon Ruptures in the Forearm and Hand. Bates, J.; Wilson, J. M., and Smith, J. W., J. Bone & Joint Surg. 42-A:637, 1960.

This paper analyzes 80 subcutaneous ruptures of the flexor tendons in 78 patients who were examined and treated over a period of thirteen years. The tendons involved included the flexor digitorum profundus, the flexor digatorum sublimis and the flexor pollicis longus. In the authors' series the condition occurred primarily in male patients. There are several good charts illustrating the statistical aspects of this series.

In the authors' opinion, the cause of these spontaneous ruptures is excessive use superimposed on preexisting localized degenerative changes. The condition is not rare; as a matter of fact, the authors consider it exceedingly common, stating that frequently the traumatic defect is not recognized. It is emphasized that no specific treatment is "frequently the best treatment" for ruptures of the profundus and sublimis tendons. In rare cases it may be necessary to resort to a simple tenodesis or perhaps to excision of a portion of the ruptured tendon. Only when flexor function has been severely compromised or lost is it necessary to perform a radical operation.

CHARLES M. SWINDLER, M.D.

Proliferative Ovarian Tumors. DiMasi, F., and Grogan, R. H., Obst. & Gynec. 15:315, 1960.

The authors reviewed the cases of 312 patients with ovarian neoplasms, operated on during eleven years at St. Elizabeth's Hospital in Brighton, Massachusetts. In 65 of these cases the tumors were primary malignant neoplasms. In 6 of this group a primary malignant growth was present in addition to ovarian carcinoma (adenocarcinoma of the cecum, bilateral mammary carcinoma, adenocarcinoma of the rectum, adenocarcinoma of the sigmoid and, in 2 cases, adenocarcinoma of the uterine corpus).

Eight of the 65 patients with primary ovarian malignant tumors had previously undergone pelvic operations or irradiation, or both. In the authors' material, the incidence of previous operation and/or irradiation appears to be high in cases of primary ovarian carcinoma.

EGON W. WINTER, M.D.

Carcinoma of the Breast. Skandalakis, J. E.; Nicolson, W. Jr.; Gray, S. W.; Macris, A.; Mitchell, W. E.; and McRae, F. W., Surgery 45:912, 1959.

This is a review of 377 cases of carcinoma of the breast among white patients operated on in a private hospital in the Atlanta area. Most of the operations were performed by two of the reporting surgeons. More than forty surgeons participated in the series, which extended from 1925 to 1954. Of the 4 male patients in the series, 1 is still living, with no evidence of disease five years after the operation. Radical mastectomy was performed on all the male patients. A slight shift toward a younger patient was noticed in this group. The most common location for the tumor was the upper outer quadrant of the breast, and the upper inner quadrant was next. The highest mortality rate was associated with lesions in the inner lower quadrant. In those cases in which complete records were available, the presenting complaints were as follows: Presence of a lump, pain in the breast, nipple discharge, trauma and nipple retraction.

Probably the most interesting feature of the article is related to the efficiency of the individual surgeon. The authors made a division between the results obtained by surgical specialists and those classed as "occasional" operators. The best qualified surgeons with the greatest experience obtained 64.3 per cent out of five-year survivals, while for those who operated only occasionally the survival rate was 40.6 per cent. It was interesting to note that the specialists performed simple mastectomy in approximately one-third of their cases, while the "occasional" surgeons rarely employed it.

The authors conclude that mammary carcinoma appears later in nullinparae than in women who have borne children. They point out the obvious need for standardization of

treatment but conclude that the hope of achieving it can not yet be fulfilled.

JAMES S. ERWIN, M.D.

The Effect of Urea on the Postoperative Excretion of Electrolytes. Murphy, G., Fishbein, R., and Rush, B. F. Jr., Surgery 48:485, 1960.

After operation, retention of sodium and water is to be expected; but urea has been found to increase the renal output of water, sodium, potassium and (nonionized) mannitol. It has been given clinically to reduce cerebral edema.

An experiment was conducted by giving postoperative patients 40 Gm. of urea for one day, in addition to other fluids. For sodium the untreated group showed a maximum individual excretion of 76 mEq. in twenty-four hours; with urea the volume was 200. The untreated group showed an individual maximum of 68 mEq. of chloride; the urea-treated patients excreted 230 mEq.; with potassium the values were 70 and 124; the range of excretion among all the patients was high.

This study presents an experimental fact without demonstrating the usefulness of the procedure to the postoperative patient.

SIDNEY VERNON, M.D.

Chest Wall Tumors. Spear. H. C., Daughtry, D. C., and Chessey, J. G., Am. J. Gastroenterol. 37:520, 1960.

The authors review a series of 30 cases of chest wall tumors seen in the Department of Surgery, University of Miami School of Medicine. Seventeen of these were considered benign and 13 primarily malignant. All of the tumors except 1, a Ewing sarcoma, were treated by surgical resection. Chondroma was the second most common benign tumor encountered. This tumor however should be regarded as potentially malignant, however, even though an initial biopsy proves it benign. For that reason the authors recommend wide block resection of chondromas because, in their experience, some of these have become locally malignant. Neurogenic tumors were the most common of the benign lesions. Chondrosarcomas were the neoplasms most frequently encountered.

The surgical approach to tumors of the chest is discussed, with special emphasis on the importance of early and adequate primary excision by the thoracotomy approach and radical resection when indicated by study of the excised specimen. It is the authors' opinion that early radical resection will result in a much higher salvage rate; especially for chondrosarcomas. They are convinced that at least half of all deep-seated tumors of the chest wall will eventually prove malignant. Repair of defects in the chest wall resulting from radical excision is most easily effected by the accepted plastic technics. The authors consider the use of prosthetic materials unnecessary.

CHARLES M. SWINDLER, M.D.

Mediolateral Episiotomy. Inmon, W. B., Southern M. J. 53:257, 1960.

Excluding ligation of the umbilical cord, episiotomy is the most commonly performed obstetric operation; and, as regards the welfare of both mother and infant, it is of the utmost importance.

In this study the importance of episiotomy is emphasized, and a technic for adequate mediolateral incision and exact reapproximation of the incised structures is described. If this is accomplished, good anatomic and functional results are consistently obtained, third-degree lacerations are virtually eliminated, and the incidence of pelvic relaxation is greatly decreased.

EDMUND LISSACK, M.D.

Simple Bone Cysts. Cohen, J., J. Bone & Surg. 42A:609, 1960.

The author studies six cases of simple bone cyst. He centers his observations on cystic fluid and offers a theory of pathogenesis.

Simple bone cysts have never been truly studied, and the literature does not offer much information concerning the cystic fluid, which it has, compared to normal fluids, a very high percentage of protein.

Owen has outlined the electrophoretic pat-

terns of normal and pathologic body fluids. The author used these observations and compared his own, which were quite identical.

In 4 of the cysts the fluid resembled plasma, and in 2 it resembled blood. As for the etiologic factors, the principal one may be drainage of intertistial fluid in a rapidly growing and rapidly re-forming area of cancellous bone.

RAYMOND LARICHELLIÈRE, M.D.

Ehrlich's career is another example of what a sufferer from tuberculosis may accomplish. Ehrlich, at the age of thirty-four, developed pulmonary tuberculosis, showed tubercle bacilli in his sputum, and had to abandon his work for a time. By careful attention to his health, however, he recovered and lived to the age of sixty-one, accomplishing such work as few are permitted to do.

—Major

Give me the young man who has brains enough to make a fool of himself.

—Stevenson

A fellow who is always declaring he's no fool, usually has his suspicions.

—Wilson Mizner

I love fools' experiments. I am always making them.

—Darwin

Let a fool hold his tongue and he will pass for a sage.

—Publilius Syrus

Who lives without folly is not so wise as he thinks.

—La Rochefoucauld

No wise man ever wished to be younger.

—Panin

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